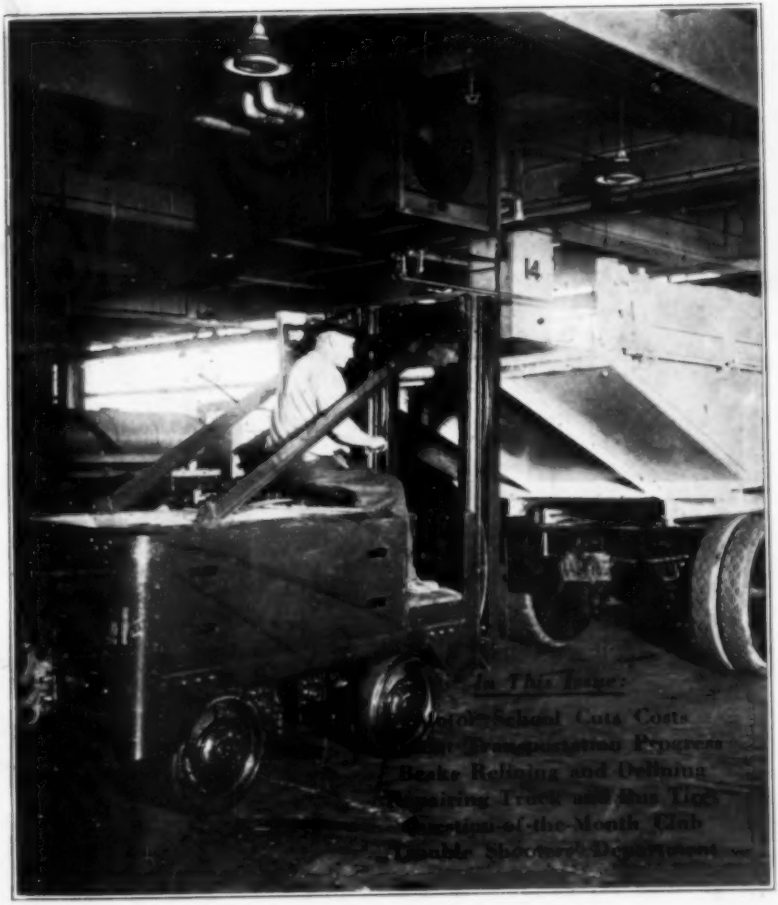
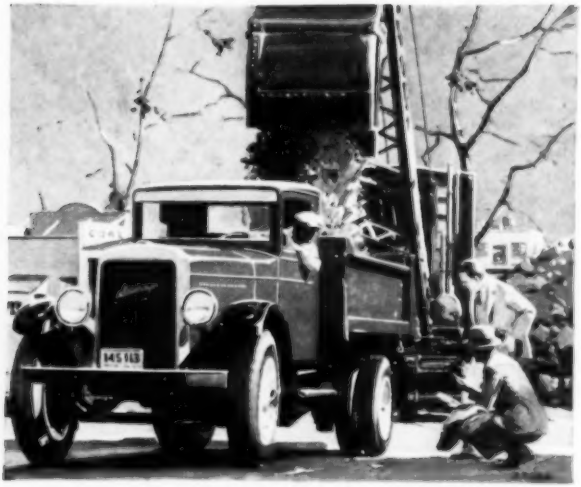
Vol. 1, No. 3 SEPTEMBER, 1920

The FLEET OWNER





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The average Reo dealer, too, has for 12 years been fitting SPEED WAGONS to the haulage requirements of numerous local businesses.

Don't look upon the SPEED WAGON salesman as just another man with something to sell. He has been trained to serve you wisely and intelligently. Behind him is the knowledge that wide trucking experience teaches; behind him is a Reo dealer with a reputation to safeguard—and a great factory which he must faithfully represent.

In all fairness to yourself, call Reo in.

REO MOTOR CAR CO., LANSING, MICH.

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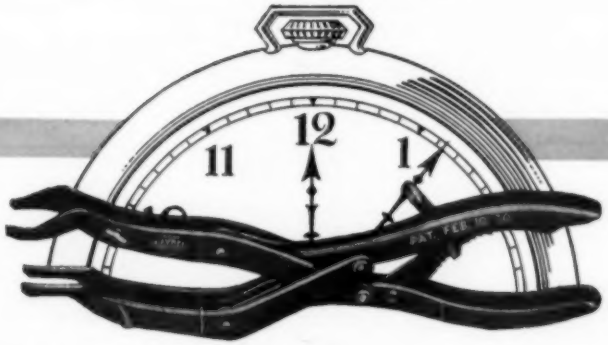

The K-D keeps pace with the clock because it's built as well»

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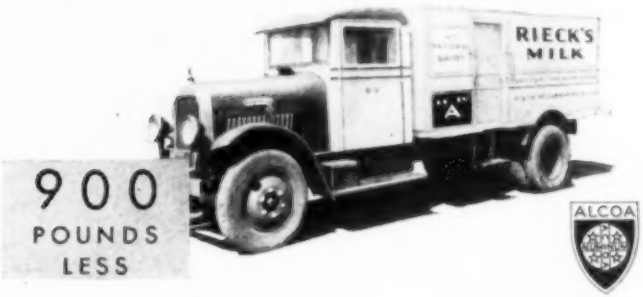

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Alcoa Aluminum Alloy structures, weighing only one-third to one-half as much as steel, meet all requirements of safety, strength and durability. Truck operators in practically every field are daily proving the advantages of the light, strong Alloys of Alcoa Aluminum for truck bodies.

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The FLEET OWNER

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Subscription
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HENRY CLAY FISCHER
Editor

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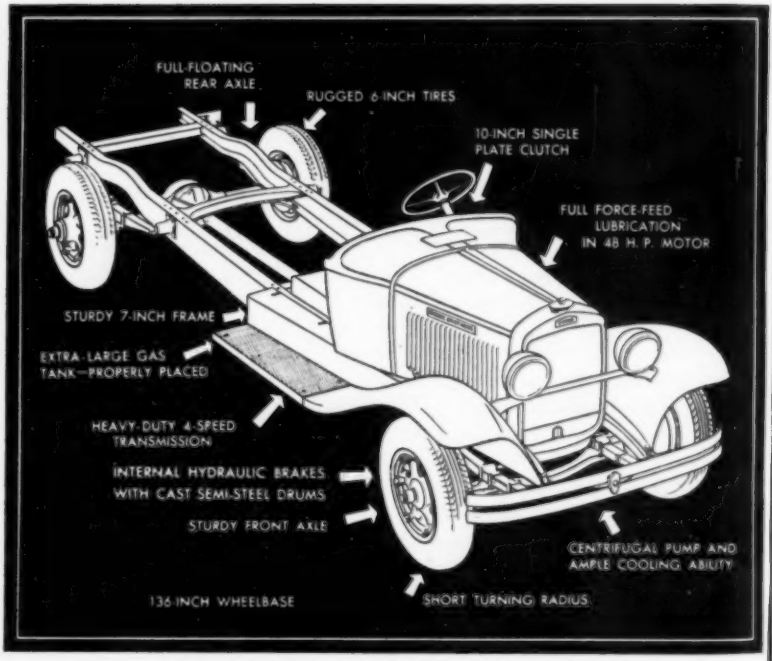
1½ TON DODGE


FULL-FLOATING REAR AXLE
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"HANDY GOVERNORS Have kept our trucks out of the repair shop"

"In studying our delivery problem, we found that excessive truck repair costs and accidents were due entirely to too much speed. We installed Handy Governors on three of our trucks as an experiment. After watching these trucks for several months, we ordered Handy Governors installed on our whole fleet. These Governors have reduced our truck maintenance costs, they have kept our trucks out of the repair shop, and they have reduced our truck accidents to a minimum. Our salesmen have still been able to make deliveries on schedule."

ALBERT GORDON
for Gordon Bread Company
Los Angeles, Cal., April 3, 1930

Steadily the evidence accumulates. Handy Governors ARE cutting delivery costs for the baking industry. They DO keep trucks out of the repair shop, and running sweetly on the job. THEY DO INCREASE OWNER PROFITS.

President Gordon's own story of the Gordon Bread Company's Handy Governor experience needs no elaboration. Read it. Ponder it. Remember that every day a truck spends in the shop costs you more than the Handy Governor that would have kept it at work.

And don't overlook Mr. Gordon's closing paragraph. Surprising though it may be, high speed actually retards deliveries. Governed speed expedites them. Especially is this true of Ford or Chevrolet fleets.

Let us put you in touch with a nearby distributor. He will tell you the whole story.

HANDY GOVERNOR CORPORATION
3934 W. Fort St. - Detroit, Michigan

The FLEET OWNER

"For Those Who Service Their Own"

PUBLISHED monthly in the interests of Automotive Fleet Owners who maintain their own Repair and Service Shops, and devoted to the better operation and maintenance of Trucks, Passenger Cars, Busses and Taxis.

HENRY CLAY FISCHER, Editor

Vol. 5 New York, September, 1930 No. 3

Getting After "Mr. Blow-By"

OUR attention has recently been called to a newspaper clipping which relates how a police official of one of our largest cities intends to prosecute owners and operators of automotive vehicles that emit too much "smoke or gas." He says that operators of offending cars will first be warned and then complaints will be lodged against them, holding that today's vehicles have reached an apparent state of perfection and should not make their presence obnoxious. Busses and trucks are the worst offenders, he further states.

All of which brings us back to the old story of periodical and proper engine reconditioning. If, as he says, busses and trucks are the worst offenders, it behooves every fleet operator to give more thought to his maintenance schedules. Remember that it is the owner who pays, and pays, and pays.

When you put in an extra quart of oil that is to be prematurely consumed, you pay for the piston ring job that you *need*, but did not get. When you stop to change spark plugs and interrupt road schedules, you also pay for these pistons and rings, although they still are on your shelves or in your jobbers' hands.

When you find that your gasoline mileage is *decreasing*, due to longer runs in low gear and accompanying evils, does it not occur to you that you are thus *paying* for something you did not get?

If these paragraphs have the essence of a sermon, we apologize, for surely ours are not the duties of a preacher. When the writer had occasion first to drive behind a smoky truck that almost asphyxiated him and later took a ride in an unloaded bus that ran for almost a mile in second gear on a level road, all because these engines *needed* reconditioning, the newspaper clipping came to mind and with it a desire to get this off his chest.

Perhaps it is a good thing that this police official intends to make fleet owners "reconditioning conscious." Remember, it is the owner who pays.

The Cover Picture

THIS month our cover picture portrays a novel and very useful piece of shop equipment that is being used to excellent advantage in one of the largest fleet maintenance shops in the country.

The machine, fashioned from an electric industrial truck, several of which were on hand as surplus stock, is used to do many odd jobs around the shop, principally as a "pusher" for moving a vehicle to and from the various departments while it is temporarily disabled. It can also be used as a "tractor" for towing vehicles into the garage and into various sections of the building for repairs.

It was not a very difficult job to put together. Upon careful observation the reader will note that the outfit was constructed using standard, structural shapes, such as angle irons, I-beams and channel rails. Two pairs of old, discarded, Model T Ford springs are used to absorb the impacts. The riveting outfit, welding and cutting torch and a few woodworking tools were all that were necessary to complete the job.

No doubt there are many fleet shops throughout the country wherein "home-made" tools, shop equipment and devices of this character have been fabricated, due to the ingenuity of the mechanics. The Editor will be glad to pass these ideas along, through our regular medium of information.

The Editor

Motor School *Cuts* Costs

How New York City's Police Department Educates Its Officer Drivers and Eliminates 50% of Troubles

By John J. O'Connell*

ECONOMY is a factor of instant importance to every operator of fleets of trucks or motor cars.

Therefore, when the New York Police Department evolves a plan and puts it into practical effect with its large fleet of cars, whereby half of all motor troubles are eliminated, the number of machines taken out of use for reconditioning radically reduced, and savings effected in parts alone amounting to thousands of dollars, then that plan becomes at once interesting to fleet operators everywhere.

Behind the spectacular results achieved by the New York Police Department lies the story of an ingenious experiment—an experiment which, fortunately, is readily applicable to motor fleet operations in general, and often without any additional overhead cost.

The key to the plan is so obvious that one immediately wonders why it was never thought of and applied before. The substance of it is simply nothing more than education.

In 1928, soon after Grover A. Whalen, then manager of the John Wanamaker stores in New York, was made Police Commissioner of New York City, he began studying the motor transport division of the police department. Further analysis evolved the idea that some plan of training and education might be applied to the 1,600 men in that division which would achieve at the same time both higher efficiency and reduced cost.

Thus was born the Motor Transport School. The amazing results summarized above soon followed. A brief resume of the manner in

---

* *Deputy Inspector; Dean of New York Police College, of which the Motor Transport School is a Department.*

which the school was organized, and of its accomplishments, will enable the motor fleet operator better to compare the problems faced by the New York Police Department with his own problems.

$3,000 Saved in Four Months

THE New York Police Department at the time the school opened used a fleet of 900 cars and trucks, of which approximately 600 were Fords. During the first four months of the school the police garage reported servicing and repairing 2,233 cars, all of which had obviously been withdrawn from use for longer or shorter periods while repairs were being made. A year later, in January, 1930, after the school had been in session long enough to make its influence felt, the repair and service figures for the corresponding four-month period were only 1,712 cars—521 less than the year before. And the books showed a saving in parts alone amounting to $3,000 during the four months!

The success of the motor transport school did not come by accident. Every step in its organization and in its subsequent operation was thought out with painstaking care, and with the advice of some of the best educators in New York City. Commissioner Whalen called in distinguished professors from Columbia University, New York University, and the College of the City of New York, all of whom collaborated in the plan. The feature about it all, of which its organizers are perhaps most proud, is that the college, aside from incidental teaching equipment and furnishings for the classrooms, has not cost the taxpayers of the city one cent.

The fourth floor of the Police Headquarters Annex was assigned to the school. This comprised eleven classrooms and laboratory space, with a total area of 15,000 square feet. A motor repair shop was installed, equipped with com-

A class of the Motor Transport School receiving instruction on a Ford chassis. Instructor is Sergeant Joseph Baer.

These Fleets

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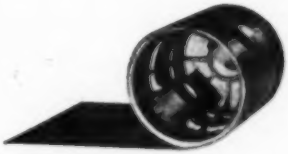
These are but a few of the representative fleets in the country who use DeLuxe Pistons in all of their rebuilding.

have proven to their complete satisfaction that for fast overland service as well as heavy hauling DELUXE PISTONS assure far longer life,* quicker acceleration and lower oil consumption.



* 75,000 miles of service is common with DELUXE users. There's no substitute for DELUXE PISTONS or DELUXE performance.

Deluxe Products Corp.
309 Lake St.
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DELUXE
LIGHT WEIGHT CAST IRON
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plete service equipment. Ford parts boards, illustrating every part needed in the new car, were erected in the classrooms. In addition, a number of cut-away motors and chassis, rear axle assemblies, and similar pieces of movable and stationary automotive equipment were provided for the laboratory work. Because of the large proportion of Fords used by the New York Police Department, much of the Instruction centered on this motor and its chassis.

The six instructors of the school were picked from among the officials of the motor transport division of the force, which controls all the motor cars and trucks used by the department. The men chosen were asked to rearrange their regular duties in such manner as would allow them several hours free time at specified periods during each week. This plan made possible recruiting the entire teaching staff without interfering with the regular routine of the department, and without additional expense.

An advisory board was then formed from among those outside educators who had collaborated in the plan. This board embraced nine prominent educators from Columbia University, New York University, the College of the City of New York, and from the municipal Board of Education. This voluntary board maintained a careful check on all teaching efforts at the start, and helped correct faulty methods.

Class session of the Motor Transport School. Lieutenant Wm. Goodnow is shown at the board instructing on braking principles.

The faculty was given its assignments three months before opening of classes. Each instructor later submitted an outline of the material he proposed to give his classes, and finally before taking over the teaching each instructor appeared before the advisory board and his colleagues, and delivered a sample lecture. This breaking-in process continued until the start of the classes.

During this preliminary period the outside educators who were

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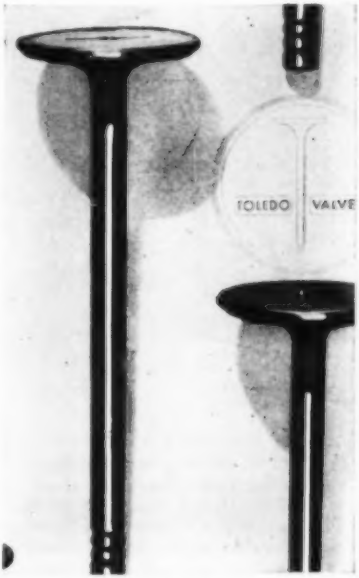
Economical fleet operation lies in high mileage and low maintenance. Toledo "Super-Forged" Valves help you get both. Gas consumption is lower, regrindings are fewer, up-keep per mile is less in Toledo equipped motors.

Many of the largest fleet owners in the country have standardized on Toledo "Super-Forged" Valves because tests have proven their superiority in the modern high-speed, high-compression motor. Toledo Valves do not warp, pit or scale; as a result fewer regrindings are necessary, and the truck spends more time on the road.

Investigate for yourself the reasons for the superior performance of Toledo "Super-Forged" Valves and you, too, will see why it pays to specify them for your fleet.



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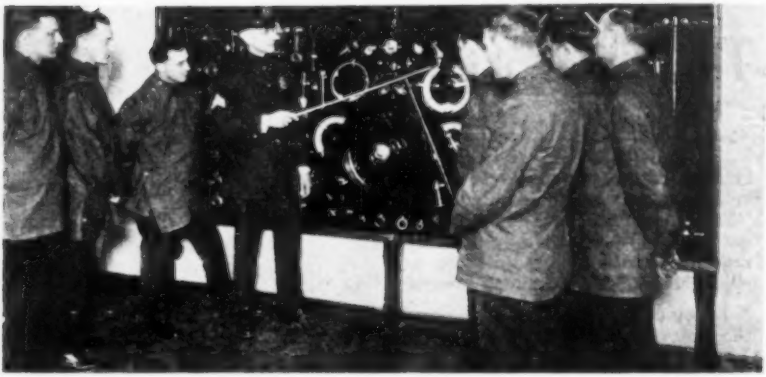

Sergeant John Brennan instructing a class at one of the parts boards in the Motor Transport School.

helping frequently expressed astonishment at the readiness with which the policemen absorbed the rudiments of sound teaching methods. The policemen themselves developed considerable enthusiasm about the new institution, and now take distinct pride in it.

Classroom Study Adopted

STUDENTS for the school were divided into classes of thirty or thirty-five men. The schedule provided that each student was to receive four hours of instruction on one day of every week for a period of ten weeks. During that period every principle and mechanical detail of the automobile was covered thoroughly. It was found that the students, by the time of the graduation, were far more expert in handling a car, and far more proficient in its proper care, than before entering the school. The surprise in this fact is not so much the improvement, as that it was accomplished in men who were already acknowledged to be expert chauffeurs—for every member of the motor transport division of the New York Police Department is made to show proof that he is already a driver of long experience before he is admitted.

The complete course of instruction in the New York Police Department's school now includes lectures and demonstrations covering the following subjects: brakes, lubrication, transmission, tires, carburetor, steering apparatus, cooling system, axles, ignition and timing, batteries, electric motors, lights, horn and signals, clutches, differential, generator, muffler, wiring coils, magneto, spark plugs, springs, wheels, bearings, alignment, body, chassis, accessories, troubles and accidents.

Since the start of the school an expert from the Ford Motor Company has been in almost constant attendance at the classes, assisting in technical instruction, advising the classes on methods of economical maintenance and operation, and su-

(Please turn to page 64)

FLEET OWNERS CHOOSE WILLARDS

. . for uniform battery quality

A Willard-equipped fleet of ice cream trucks of the Telling Belle Vernon Company, Cleveland, Ohio.

ECONOMICAL operation is the primary consideration of the fleet owner. That is why, in specifying fleet equipment for numerous units, the modern fleet owner looks for equipment to give him performance that is uniformly efficient, uniformly dependable. The modern fleet owner has learned that this uniformity of performance is the chief factor in operating economy.

And he finds in Willards — a uniform and unvarying high quality of construction, a constant dependability in operation. These are the sound reasons for his choice — and the reasons why so many fleet owners specify Willard batteries.

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Recent Transportation *Progress*

In Which an Engineer Outlines Important Improvements Found in Present-Day Trucks and Busses

By Ethelbert Favary *

ABOUT twenty years ago the term "saturation point" in connection with automotive vehicles was very much discussed and feared by the industry. Today we have forgotten all about the saturation point, the use of automotive vehicles still growing continuously. The question of the saturation point was a question only as long as the automobile was considered a luxury. Today it is a necessity for it brings about an economic gain, be it for the private owner who employs it in his business rather than relying on other means of transportation to take him from place to place, or for corporations which could not prosper without it. Today the motor vehicle is the "backbone" of many branches of business and industry.

The motor vehicle of today is cheaper than it was in 1914, while the cost of living is considerably higher. For instance, taking the 1914 value of the dollar for general merchandise, foodstuffs, etc., as costing 100 cents, that same 100 cents gives us today only 62 cents of value compared with 1914, while of every 100 cents which purchased a dollar's worth of automobile in 1914, we today get 113 cents' worth of value. This, of course, is due solely to the quantity production of vehicles and their parts.

The progress made in motor vehicle design and construction is just as great or greater than it has been at any time. The refinements are giving increased safety and increased comfort as well as decreasing the cost of maintenance.

Among the items of recent improvement might be mentioned the following: improved lubrication; improved springs, and better riding vehicles; improvements in engines designed for smoother operation and for a higher thermal effi-

ETHELBERT FAVARY

* *Member, Society of Automotive Engineers; Consulting Engineer, Morcland Motor Truck Company.*

Snap-On ~ Blue-Point TOOL SERVICE

A Message to Superintendents and Foremen of Truck and Bus Fleet Shops:

A Snap-On, Blue-Point salesman is instructed to call regularly at your shop. You will recognize him by his white coverall uniform and sample cases.

His job is to render a personal tool service to the mechanics.—help them keep their kit equipment complete and up to the required standard of efficiency. Good mechanics appreciate this service because they can see and try what they buy, right on the job. He is also instructed to see you personally on any tools required for the crib. He takes little time in the shop because his samples are arranged for quick service. He will be a big help to your shop if you use him to check all hand tool equipment regularly.

Over 350 salesmen are engaged in Snap-On, Blue-Point service throughout the United States and Canada. If you are not getting Snap-On, Blue-Point service regularly, please let us know and we will check up with our man in your territory.

Snap-On Tools, Inc., Manufacturers

MOTOR TOOL SPECIALTY COMPANY

14 E. Jackson Blvd., Chicago, Ill.

Cable Address: "Snap-On"—Code Bentley's

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ciency; improvements in transmissions, and last, but not least, an improved appearance.

In motor freight transportation improvements have perhaps been even more marked. In order to keep abreast with the times, which calls for greater speeds and higher earnings from a given investment, may be cited the demand for pneumatic tires on even the heaviest of trucks; six-cylinder engines; four-wheel brakes for all types of trucks; multi-speed transmissions, and six-wheel trucks.

I will briefly mention the advantages derived from the last items or rather their result upon motor transportation. The demand for increased speed necessitated pneumatic tires and six-cylinder engines. By an increased speed it is possible for the truck to cover greater distances and since the driver's wages and the investment are fixed items, the increased speed brings about lower costs per ton mile. The increased speed necessitated four-wheel brakes for adequate safety.

In order to still further increase the amount of work done by one man and one unit, the capacity of the truck has been increased; this brought about the six-wheel truck construction. To make trucks more flexible and to run the engine at a more efficient speed, necessitated the use of multi-speed transmissions. Transmissions with seven (or more) speeds forward and two reverse are now quite common for trucks from about four tons up.

Pneumatic tires permit greater speed of travel while at the same time increasing the riding qualities of the vehicle. An increased cushion for the chassis mechanism decreases the vibrations arising from road shocks. As is well known, vibrations will cause fatiguing of metal parts and finally breakage. Pneumatic tires are therefore increasing the life of the chassis and decreasing the cost of maintenance and repair.

Pneumatic tires give increased speed because they have less traction resistance over the average road than the solid tire. Solid rubber being slow in action, a certain amount of energy is consumed in compressing the rubber, which is not returned to the wheel as it rotates. *(Continued on page 22.)*

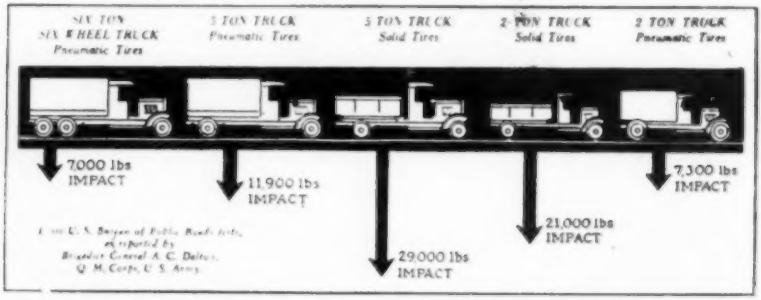

Figure 1—Graph showing tests made by Bureau of Roads.

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and Keeps 'em Rolling

PERFECTLY lubricated bearing surfaces never wear out. By clinging to metal under the most severe operating conditions, "D-A" keeps bearing surfaces apart. It seals the bearings against water, sand, grit and dust where ordinary greases and compounds squeeze out or burn up. Test your lubricant to see if it will cling to hot metal or withstand actual flame. "D-A" alone will do it! It's a densified Pennsylvania oil.

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Order From Your Dealer—Immediate Delivery

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FOR
ROLLER BEARINGS, GEARS, PRESSURE FITTINGS, CHAINS, CABLES

Up to a comparatively recent date the four-cylinder engine was almost exclusively used for trucks because six-cylinder motors were not particularly suitable for trucks. New developments and improvements made in engine design and construction have rendered the present six-cylinder engine far more economical and more efficient in service.

The advantages of the present day six-cylinder truck and motor bus engine may briefly be summarized as follows: greater efficiency (thermal efficiency) that is, more power developed by the engine for a certain amount of gasoline used; reduced vibration due to several distinct causes; quicker getaway due to increased engine acceleration; more power developed for a given engine weight and increased speed; smoother operation resulting in longer engine and chassis life, and decreased cost of repairs to engine and the entire chassis.

In most motors operating on the road, over 75 per cent of the power contained in the gasoline is lost, the loss being composed of heat losses through the cylinder walls and through the exhaust. A gasoline motor is a heat engine which transforms the heat arising from the combustion of the gasoline into mechanical power.

The six-cylinder engine was formerly less efficient because for a given amount of total cylinder volume there is a greater area of cylinder wall exposed to the hot gases than with four cylinders and this caused greater thermal losses.

In other words, the amount of cylinder wall area coming in contact with the explosive gases increases with the number of cylinders (for the same total volume of fresh charge) and as the temperature during the explosion is about 4,000 degrees F., while the water used for cooling is at a comparatively low temperature it can easily be realized how large is the amount of heat

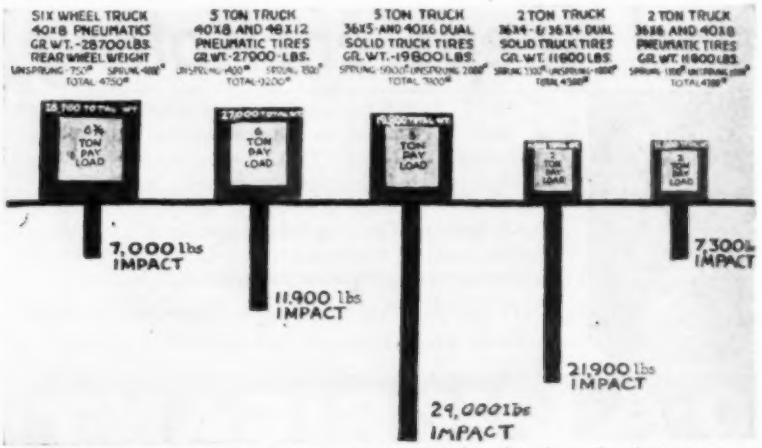


Figure 2—Detailed explanation of the graph, showing the impact tests made by U. S. Bureau of Public Roads.

CHEAT PROOF KEY-CONTROLLED

SPEED GOVERNOR

THE fleet owners' assurance of reduced maintenance costs.

For his own protection, to safeguard his investment in vehicle equipment, the fleet owner should hold every one of his trucks and cars to a speed limit where abusive driving is impossible.

The CHEAT PROOF Governor has proven its ability to give that protection—without any loss of power. The responsive action of this governor permits the same flexible acceleration and does not affect in the least the efficiency of the motor.

Cheat Proof installation means greater tire, gas and oil mileage—longer life to brake linings, motor and chassis—fewer accidents—more miles on the road, less hours in the shop.

The exclusive key control feature means quick adjustment—instant sealing—absolute protection against tampering.

Write us today for Folder 302 T and details regarding special test offer to fleet owners.

JOHN C. HOOF COMPANY

162 N. Franklin St. **Chicago, Ill.**

Transportation Progress
(Continued from page 22)

wasted through the cylinder wall.

The maximum pressure derived from the combustion of the explosive mixture in the cylinder is about four times the absolute compression pressure. If the mixture were compressed to 65 pounds gauge pressure, which is 79.7 pounds absolute pressure, the resultant pressure upon ignition would be about 320 pounds per square inch.

Evidently the greater the compression pressure, the greater is the resultant pressure after ignition and the higher is the engine efficiency. Fuel mixtures cannot be compressed more than a certain amount because fuel knocks appear; that is, detonation takes place. Detonation depends very largely on the temperature of the hottest portion within the cylinder and this is the center of the piston head. The piston head is chiefly cooled through the cylinder walls, hence the temperature of the piston-head center depends on the piston diameter and on the temperature of the water in the cylinder jacket.

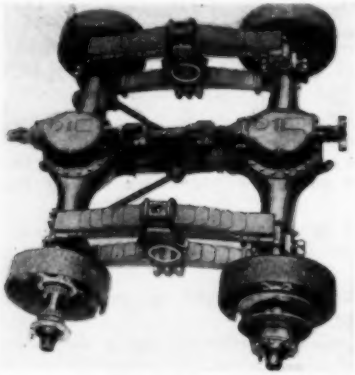


Fig 3—A typical six-wheel axle for trucks and busses.

By using a six-cylinder engine it is possible to use smaller pistons for the same power output, therefore the center of the piston head remains cooler, the water temperature can be increased, thereby reducing the heat losses through the water jacket and this added to the higher compression pressure gives a higher engine efficiency.

Due to the large number of power strokes per minute and to the smaller diameter of the piston, the lighter weight of the reciprocating parts and the smaller, varying stresses in the crankshaft, the vibrations are greatly reduced and this results in decreased cost of repairs and maintenance.

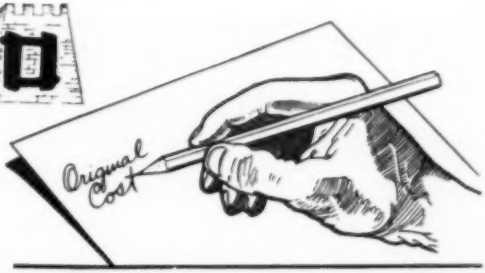
Gasoline engines give their greatest efficiency at a given speed and a given torque. By using a 7-speed forward transmission it can easily be understood that the engine can be run for a greater length of time at its most efficient speed; also when going up grades the truck speed can usually be greater when there is a 7-speed forward transmission than when there are only four speeds.

Six-wheel truck production is of comparatively recent date. To protect the highways from undue wear and tear, practically all the states limit the weights on motor trucks. Government tests have shown that it is not the gross weight of a truck but the wheel load which causes destruction of the road, hence by increasing the number of wheels it is possible to carry a heavier load on the truck and yet destroy the road to a smaller extent.

The accompanying diagrams show

(Please turn to page 64)

PE-KO



Pays for itself in approximately six months

Figure it this way—

Figuring on a minimum of 12 stubborn tire changes monthly (average cost of $1.00 per hour without a PE-KO machine)..$12.00

With a PE-KO, figuring on a minimum of 12 stubborn tire changes monthly requiring approximately ten minutes each (average cost of $1.00 per hr.) 2.00

Money saved per month....$10.00

The PE-KO Tire Changer comes to you complete with tire tools at $58.00 (higher west of Rockies)—there are no extras to buy. At the very least, you can expect five years of service from it. (Right now models we made five years ago are still giving excellent service.)

PE-KO Features

Evenly exerted tension and rubber pad protection; no distortion to rim or injury to casing. Convenient working height saves excessive lifting.

Built like an anvil—need not be bolted to floor unless desired. Equipped to handle every job from Ford to truck Balloon. Gets ordinary jobs out of the way in no time at all. Takes care of stubborn cases with less effort.

Place your order today with your Jobber or direct and give Jobber's name.

Pekin Foundry & Mfg. Co. **Pekin, Illinois**

Brake Relining *and* Delining

How to Correctly Remove and Replace Brake Lining on the Various Types of Brake Shoes and Bands

By O. C. Holaday*

PROPER relining of brakes is one of the most important phases of work done by the fleet service station. The correct method of doing the job should be known by every mechanic because of the increasing importance of this type of work.

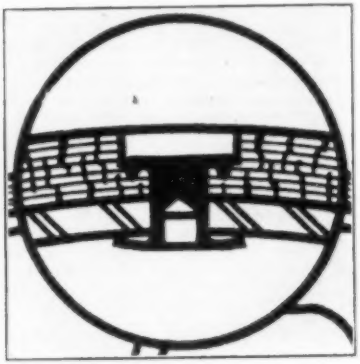


Figure A

In relining any type of brake equipment using either of the two general types of linings, woven and moulded, it is important that the lining segment be tightly riveted to the brake shoes.

The information contained here is to call attention briefly to the importance of the different steps to be taken in making the above job satisfactory.

In the removal of worn brake lining from the brake shoe or band, care should be exercised to see that the rivet holes are not distorted by the deriveting punch. Such a condition would prevent the shank of the rivet being expanded sufficiently to fill the rivet hole in shoe. The brake band also would possibly be distorted immediately around the rivet hole, preventing the lining from lying flat on the shoe.

It is general practice with all types of brakes to use annealed tubular rivets for fastening the lining to the shoes or bands.

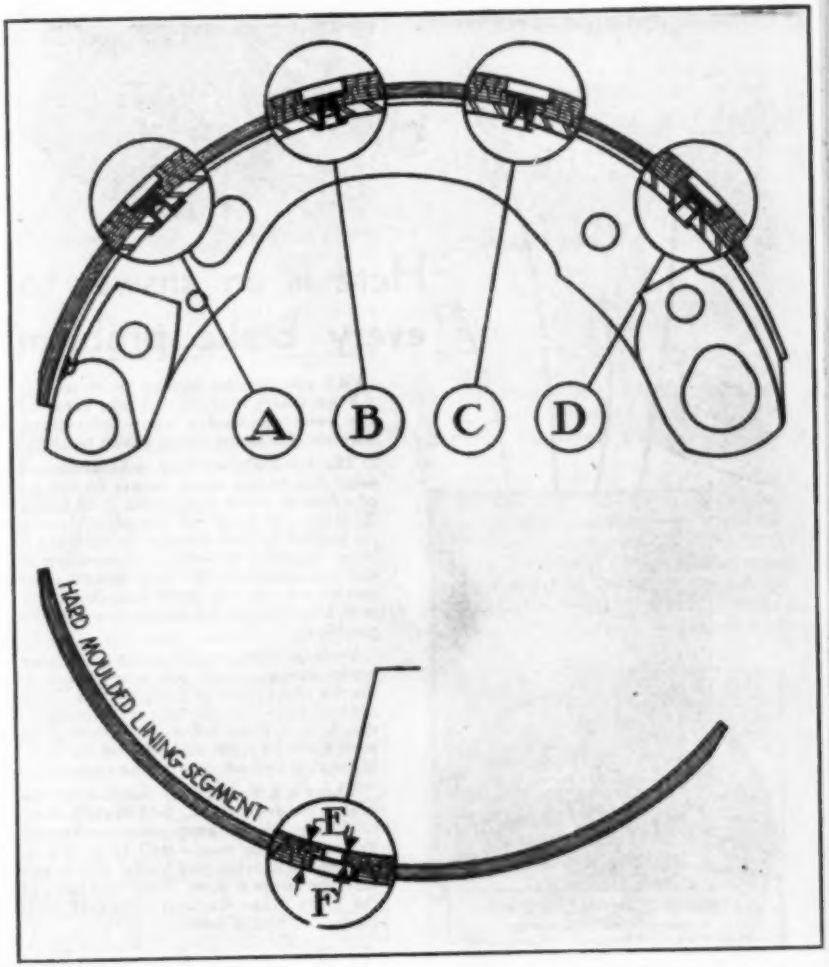
A rivet of correct diameter that will fill the rivet hole in the brake shoe is always desirable. When the shank of the rivet is upset by the riveting punch, it will tighten securely in the rivet hole by the expanding shank of the rivet.

The length of the shank of the rivet also is important in that it is necessary for a head to be rolled on the rivet by the riveting tool.

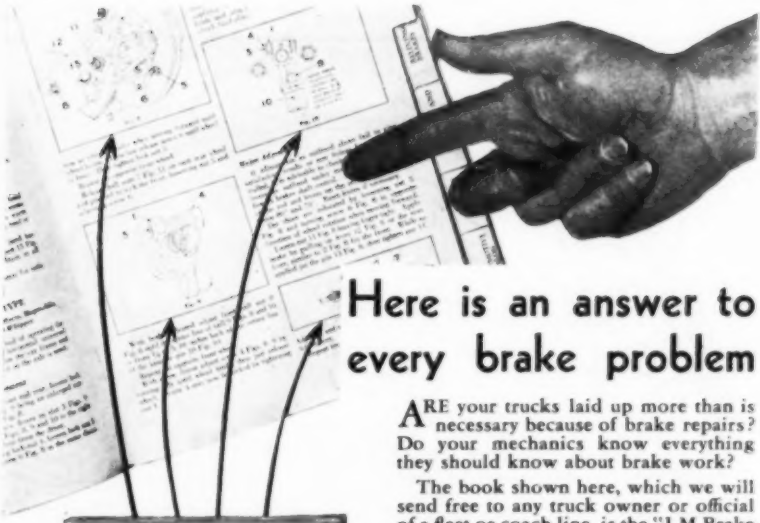
The type of brake lining that is specified by the car or truck manufacturer for his particular vehicle as a rule will be found to work satisfactorily, giving the car a sufficient safety factor in brake performance. Where possible, replacement lining should be of this type, although the make of the lining need not be the same.

To permit the satisfactory use of uniform rivets, it is necesary that the brake liners be drilled to a size

* *Service Manager, Bendix Brake Co.*



Above are shown various types of riveting jobs. Some are correct, others incorrect. On the pages following, each of the circles is shown in enlarged form with explanation



Here is an answer to every brake problem

ARE your trucks laid up more than is necessary because of brake repairs? Do your mechanics know everything they should know about brake work?

The book shown here, which we will send free to any truck owner or official of a fleet or coach line, is the "J-M Brake Re-liner's Manual"—a complete treatise on brakes. Within its pages is the knowledge acquired by years of experience in the automotive field. No matter what trucks you have in your fleet this book will give you an answer to every brake problem.

Perhaps your men are using the wrong brake lining, or are not sure of how to do the right kind of a repair job. This Manual tells you the best type lining to use, how to make adjustments, and gives your men the right information for making quick and efficient brake repairs.

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BRAKE LINING FOR EVERY MOTOR VEHICLE

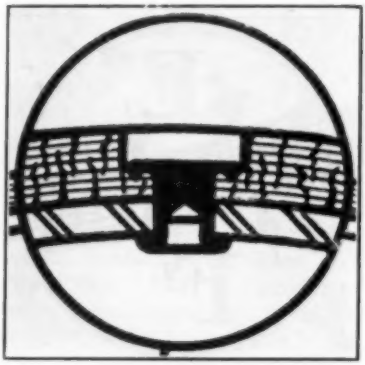


Figure B

the same diameter as the rivet holes in the shoe. These holes should be counter-bored to an even depth, permitting the rivets to extend through the brake shoe or band to an even height. In this way the riveting machine will be permitted to do a uniform operation on all rivets.

If the lining is not counter-bored deeply enough, shortly after the initial wearing has taken place, the rivet head will be in contact with the brake drum which may cause it to squeak or score the brake drum.

The riveting machine should be adjusted and fitted with the correct size anvil and punch to roll a compact head onto the rivet. At the same time, upset the shank of the rivet in such a way as to leave the rivet in tension after the riveting operation.

A typical brake shoe, with lining attached is shown in the detailed drawing appearing on page **27**. The diagrams show the various types of riveting work that are encountered in every day service work. Some, of course, are correct and others not correct. The reader will note that the five riveting jobs are encircled and that a detailed enlargement of each riveting operation appears separately, in the five smaller illustrations, numbered for convenience, as Figures A, B, C, D, E and F.

Referring directly to Figure A, the reader will note from the enlargement that in this particular case the rivet used was too long. In cases of this character, the shank of the rivet will most likely be split, instead of being rolled over, after the rivet is upset by the riveting tool.

Under this condition, the maximum tightening effect will not be produced because the diameter of the rivet head is too large, as compared with the diameter of the shank of the rivet. This, of course, is incorrect.

Referring now to Figure B, the reader will note that this is a typical example of a good job—a riveting job correctly performed. The important points to observe are that the shank is filling the rivet hole and that the metal at the band end of the rivet is concentrated into a

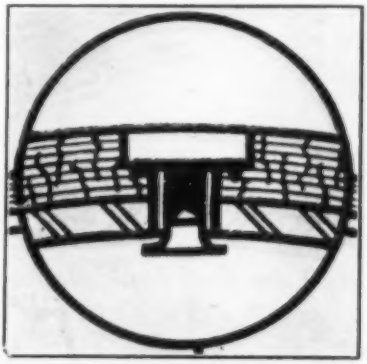


Figure C

Relining and Delining

(Continued)

compact head, which will insure its holding with maximum tightness.

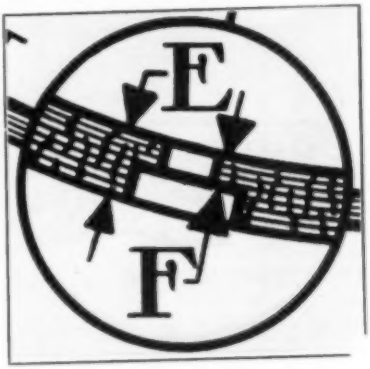
Turning next to Figure C, we find another incorrect job. This illustration portrays the fact that the fault lies in the setting of the riveting machine. At first glance, the lining immediately surrounding the rivet will appear to be tight when inspected.

However, upon close examination it will be found that the rivet has not been upset sufficiently to the proper diameter to fill the rivet hole; neither has the head been completely formed.

By raising the anvil of the riveting machine just a few thousandths inches higher, the correct upset will be obtained, such as is shown in Figure B.

Referring to Figure D, we find another incorrect and faulty installation. Here is a case of the rivet being too short for the thickness of the brake lining shown. The rivet has been properly upset, but there is not sufficient metal at the band end of the rivet for forming into a head. Looseness of the lining will develop within a short time if this kind of a job is let go through.

Figure D



Figures E and F

Figures E and F serve to illustrate the fact that the proper counter-boring specifications should be rigidly adhered to in preparing the brake lining for riveting. The following expressed in fractions of inches, shows the exact depths to use for brake diameters between eleven and seventeen inches:

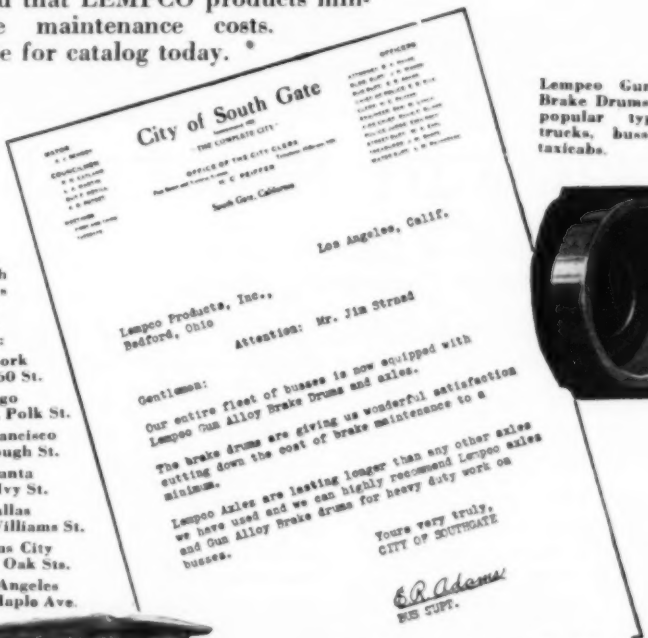
"E" is 5/32 and "F", 5/64; "E", 3/16, "F", 5/64; "E", ¼, "F", 7/64; "E", 5/16, "F", ⅛; "E", ⅜, and "F", ⅛ inches.

Because proper relining of brakes is one of the most important phases of this particular end of automotive fleet service, the foregoing treatise on the proper riveting is offered.

It is timely, therefore, for every fleet mechanic and garageman to make a careful study of the mechanisms of the various types of brakes, as well as other parts of the chassis with which they come into intimate contact every day.

EQUIPS ENTIRE FLEET WITH LEMPCO

HERE'S another instance of a fleet operator using LEMPCO 100%. You'll feel the same as Mr. Adams if you once use LEMPCO brake drums and axles. Hundreds of fleet owners have found that LEMPCO products minimize maintenance costs. Write for catalog today.



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Attention: Mr. Jim Stroad

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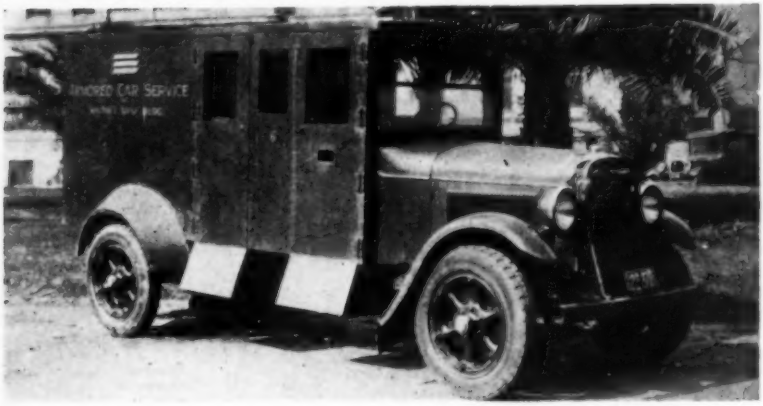

A "Bandit-Proof" Fleet

Fleet of Six Armored Cars Operated by New Orleans Company is Practically "Bandit-Proof"

AN armored car mounted on a Dodge Brothers truck chassis just added to a fleet of six armored cars operated by the Armored Car Service Company of New Orleans, Louisiana, is said to be about as near "bandit-proof" as can be built.

Puncture-proof tires that cannot be damaged by bullets are outstanding among the many features intended to baffle hold-up men. Windshield glass is one and one-eighth inches thick, protecting the driver, it is said, even from rifle bullets.

The car is armor-plated even to the top and has little port holes at convenient points from which those inside may fire at bandits without danger to themselves. Even the radiator is armored to protect the motor from bullets.

The steps are covered and the running boards cut away so that no one can "hop on" the car. Money transported in these cars is carried in a safe which is locked to a heavy steel rod inside the body, an added precaution in case the car is stolen. However, the presence of a guard inside the car at all times minimizes this possibility.

In addition to the details listed, several others are built into the car, it is said, but not announced so that many surprises await the bandit who tries to "stick-up" this formidable money hauler.

Saves in time and cost

PROTEX Glass is by far the most economical protective glass on the market. It is far lower in initial cost, and, in addition, it saves money in installation and replacement charges.

The reasons are that Protex Glass requires no special machinery for cutting—is installed in much less time—and, being a solid plate glass, it does not discolor or deteriorate because of age or exposure in any kind of climate.

When you equip with Protex you have a non-scatterable glass offering permanent clear vision—one that retains its brilliancy and transparency and is always at the highest point of efficiency in the protection it brings to driver and passenger of motor vehicles. It is the only non-scatterable glass offering "visible safety."

Before you equip with scatter-proof glass investigate the many advantages of Protex. It will save you money in initial cost, in installation and in upkeep—and it always looks new!

Protex GLASS for SAFETY

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Some *of the* Answers *to* Previous Questions

We wish to express our thanks to those of our readers who have so willingly responded to our new "Question-of-the Month Club." It is not possible to publish all the answers received, but a few of the most interesting follow.

"We reclaim old crankcase drainage, using the "Refinoroil" machine. We find the reclaimed oil to be satisfactory and it tests closely the same as new oil. The approximate cost of reclaiming old oil is about 20c per gallon. For our fleet of 45 trucks and 50 passenger cars we use about 200 gallons of oil per month and reclaim between 75 and 100 gallons every month. In large fleets of automotive vehicles I believe that it would be advantageous to reclaim crankcase oils. This should be a paying proposition."—*G. A. Hogg, Scranton Electric Co., 509 Linden St., Scranton, Pa.*

"For our fleet of 302 trucks and 12 passenger cars, we buy oil both by brand and specification, using an asphalt base oil. In changing the oil, we analyze each draining and set the future draining periods for each truck accordingly, after each draining. Engines are inspected daily and as the oil level drops, new oil is added. We use about four barrels of oil per month and carry in the neighborhood of eight barrels on hand. Old crankcase oil is not reclaimed by us, but is sold at 1 cent per gallon."—*P. S. Vail, Supt. of Transportation, Langendorf United Bakeries, Inc., 1160 McAllister St., San Francisco, Calif.*

"The old crankcase oil that is drained from our fleet of trucks and passenger cars we use in the various manufacturing operations in our factory. We also use it to grease industrial trucks in our shops and for slides used in factory conveyors. We use about 30 gallons of oil per month and do not reclaim any."—*W. D. Gilson, Superintendent, The Robinson Clay Products Co., Clearfield, Pa.*

"Lubricating oil for our fleet of 85 trucks and 140 passenger cars, after using is drained off and reclaimed. For the present our old oil is being sent to the Ralston Steel Car Company who manufacture a machine for this purpose. They re-refine it at a cost of about 20 cents per gallon. The reclaimed oil is very satisfactory; in our opinion it is better than new oil. Our Engineering Department used to use old crankcase oil for oiling park roads, etc., before we began to reclaim it. We are anticipating the purchase of an oil reclaiming machine in the future, inasmuch as we use 400 gallons per month and reclaim about 250 gallons per month."—*L. M. Gillespie, Superintendent Municipal Garage, City of Columbus, Ohio.*

"We sell our old crankcase drainage to people who use it on the side roads for keeping down the dust. We have no oil reclaimer as our fleet consists of but 10 trucks and 1 passenger car. We use about 100 gallons per month. Oil is changed every 500 miles and none is added between changes. We do not have troubles with pistons and rings by rigidly adhering to this schedule of oil changes."—*M. J. Coogan, Coogan's Transfer & Storage, 314 Clinton St., Lincoln, Ill.*

Question-*of*-*the*-Month Club

Question Number 5—Spark Plugs

What is the average life of your plugs? .....

or, average mileage obtained per set? .....

Do you find that it pays to discard plugs after 10,000 miles, regardless of their condition? .....

Please give reasons .....

.....

How do you determine that a plug is unfit for further use? .....

.....

Is the proper selection of correct type of plug an important factor in engine performance? .....

How do you recondition spark plugs? .....

.....

Special Remarks .....

.....

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Shall we send you a free Spark Plug Recommendation Chart? .....

How many vehicles in your fleet?

.....*Trucks;* .....*Busses;* .....*Pass. Cars;* .....*Taxis*

Name of Firm .....

Address .....

City and State .....

Your Name .....*Position* .....

(Please tear out and mail to the Editor, The Fleet Owner, 90 West Street, New York.)

Care & Repair of Tires

ARTICLE III

The Step-Up Method

LAST month we discussed the proper methods of cementing patches preparatory to curing and also outlined the step-up method of tire repairing as applied to minor injuries. Now we come to major repairs.

For blowouts, large punctures and bad cuts running all the way through the tire, the number of plies added to make the repair should be the same as in the tire itself. These plies should be rectangular in shape, as previously specified in our last issue. Prepare the foundation for inside and outside repairs, as previously described and as further illustrated in Figure 1. Start building up the repair by filling the carcass cavity with cushion gum, the same as with minor outside injuries. The tread cavity should not be built up until after you have finished building in the cord plies on the inside.

Figure 1—How a major injury is skived on a 45-degree bevel from both inside and outside.

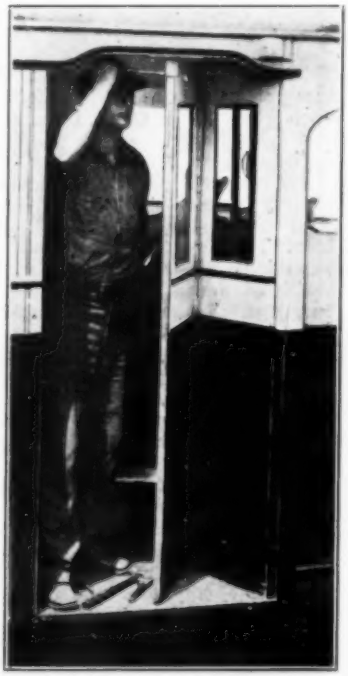
Build up the repairs as follows: First, measure for the dimensions of the plies. The first ply is to run in the same direction as the cords in the inside ply of the tire. For a given size of injury, regardless of the size of the tire, the width of this first ply is the same, namely one inch wider than the injury itself. (For size of injury, take the largest opening in the carcass after being skived, as shown in Figure 1.)

The length of the first ply, however, varies, dependent upon the number of plies in the tire, as follows:

No. of Plies in Tire	Length of First Ply in Repair
4-ply	..4 in. longer than injury
6-ply	..5 in. longer than injury
8-ply	..6 in. longer than injury
10-ply	..7 in. longer than injury

The reader will note that there are no directions given for 12-ply or 14-ply repairs. A 10-ply repair

QUIT FOOLING WITH THE DOORS



Slammed bus doors result in broken glass. Slammed doors require frequent adjustments and cause excessive wear to all parts adjacent to the doorways. Eliminate this source of trouble with N. P. air operated doors, the doors that ***will not*** slam.

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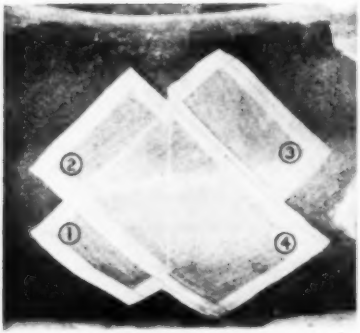

Figure 2—Showing the gum-stripping on a 4-ply step-up repair. The 3rd and 4th plies have been cut in half to show how the gumstrip butts the edges of the 1st and 2nd plies.

job, correctly applied with each ply stitched into place under proper tension, as described in our last issue. is amply strong for the larger sizes of tires, and is preferred to 12-ply or 14-ply jobs, due to the latter being too thick and requiring too long a cure.

Thus, when centered over the injury, each side of the first ply will over-lap the injury ½ in. on all sizes of tires and each end will extend beyond the injury 2 in. on a 4-ply tire, 2½ in. on a 6-ply tire, 3 in. on an 8-ply tire, 3½ in. on a 10-ply tire, 4 in. on a 12-ply tire and 4½ in. on a 14-ply tire.

The second ply is to run across the first at right angles to it. The dimension of the injury that determines the *length* of the first ply now determines the *width* of the second ply. Similarly, the injury dimension that determined the *width* of the first ply now determines the *length* of the second ply. Each side of the second ply is to over-lap the injury ½ in. and each end is to extend beyond the injury the same distance as with the first ply, namely, as follows: on a 4-ply tire, 2 in.; 6-ply, 2½ in.; 8-ply, 3 in.; 10-ply, 3½ in.; 12-ply, 4 in.; 14-ply, 4½ in.

Once having determined the correct dimensions for the first and second plies, use the first ply as a pattern for all the odd plies and the second ply as a pattern for all the even plies. Each odd ply is to be 1 in. wider and 2 in. longer than the preceding odd ply. Similarly, each even ply is to be 1 in. wider and 2 in. longer than the preceding even ply.

To be sure you have calculated the ply dimensions correctly, check your figures with the following test: The length of the first ply should be 2 in. longer than the width of the last even ply, and the length of the second ply should be 2 in. longer than the width of the last odd ply. If your ply dimensions wont meet this test, you wont have even one-half inch steps on the sides of the plies, nor even one-inch steps on the ends, as shown in the diagrams accompanying this article. Therefore, refigure your ply dimensions until they meet this test, then cut each ply accurately to its proper dimensions.

Now build up the repair by centering each ply over the injury in

Figure 3—Repair made near the bead, showing how the plies are trimmed even with toe of bead.

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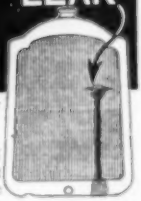

YOU can apply Smooth-On with radiator full or empty, hot or cold, without removal from the car and without putting anything inside that clogs the circulation.

Merely roll the Smooth-On into a stiff putty, press it against and into the leak with your thumb or pack it into the defect with a knife blade or screw-driver, and scrape off the excess. The leak will stop instantly, and the repair is permanent.

Cracked Water Jackets

Water jackets of automobiles, stationary or marine gas engines which have developed long or short cracks or have even had pieces broken entirely out from freezing can be made thoroughly and lastingly serviceable by similar repair, or by applying Smooth-On under straps or a plate.

Get Smooth-On No. 1 in 7 oz.; 1-lb. or 5-lb. tins at any hardware store or if necessary direct from us.

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tells how to stop gas leaks from the tank, gasoline lines and exhaust system, oil leaks at gaskets and at cracks in crank or gear case. It also tells how to make headlight posts, nuts, hub caps and bolts and grease cups stay tight, etc.

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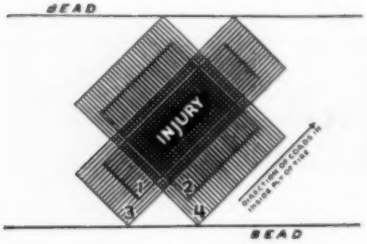
Address .....

9-30 .....



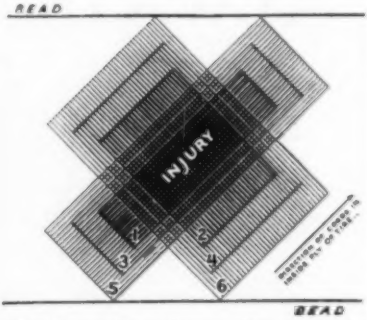
Ply dimensions for major repair in 4-ply tire where injury runs in same direction as cords in inside ply of tire.

its proper order, each odd ply running in the same direction as the cords in the inside ply of the tire, and each even ply running at right angles across the odd ply preceding it. Stitch down each ply and each gum strip as laid, being sure to follow the directions given in our last issue, so as to have the plies under proper tension.

Next, gum-strip the edges of all plies—strips to butt edges. After the last ply is on, complete the repair by covering all exposed edges with a ½ in. strip of cushion gum, as shown in Figure 2.

This completes the work from the inside. Now, from the outside, clean out the injury and if necessary, apply any additional cushion gum needed to completely fill the carcass cavity. Then fill the tread cavity with tread gum, as previously described. The inside and outside of the tire are both now ready to be dusted with soapstone. The repair is now ready to be cured.

In cases where all of the plies are not injured, such as a 4-ply inside break in a 6-ply tire, build in a new ply for each ply that is injured.



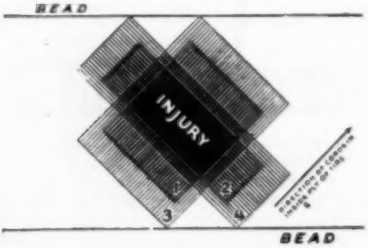
Ply dimensions for major repair in 6-ply tire where injury runs in same direction as cords in inside ply.

This will make the total number of plies over the injury the same as in the tire itself.

In the case of a very large injury, the plies may have to be so wide and so long that they will extend beyond the limits of the mold or the inside arm. To be sure to get pressure in the cure on the entire repair, cut off at right angles to the bead any plies that are too long, making a ½-in. lap instead of the customary 1-in. lap, in order to bring the ends within the pressure limits of the cure.

For injuries at or near the bead,

(*Please turn to page 64*)



Same repair where injury runs in opposite direction.

Rough Flanges don't mean leaks

When you tighten the nuts on a Vellumoid connection, the Vellumoid gasket is compressed, filling every irregularity in the flanges, and ensuring a tight connection, which stays tight, and protects your work.

VELLUMOID
THE REAL REPLACEMENT GASKET MATERIAL

For the Oil, Gasoline, and Water Connections.

The Vellumoid Co., Worcester, Mass.

"30,000 miles per set"

"Doubles our Spark Plug Mileage"

"Gets 50,000 Miles From these Spark Plugs"

Such results, testified by users, suggest why you should change to

Robert Bosch Pyro-Action Spark Plugs

Robert Bosch Magneto Co., Inc.
3603 E. Queens Blvd., L. I., New York

A nationally known
AUTOMOTIVE ENGINEER
checks up on
DUCKWORTH TIMING CHAINS!

Read below his report:

A leading authority in automotive engineering was asked recently by a large timing chain buyer to give his opinion of Duckworth chains:

After very careful tests this engineering authority reported:

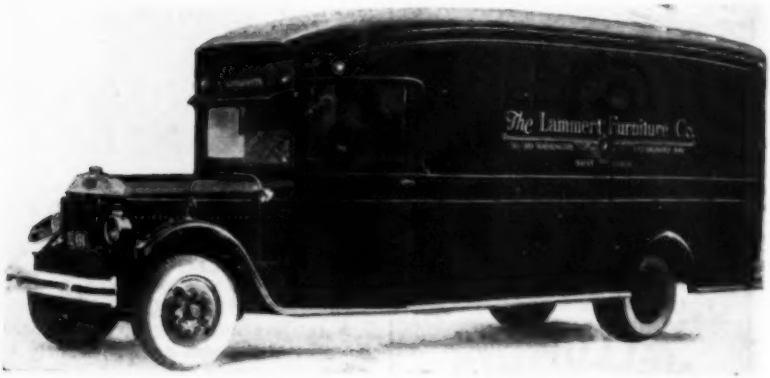
"The Duckworth Timing Chain has rather unique features making for increased life and satisfactory performance. The split tubular rivet, a patented feature, is one of these points. This in itself is worthy of minute consideration on two points: First, the soft end which makes for freedom from broken chains; and second, the split feature which permits of a small amount of resiliency, but more especially a better heat-treatment than in the case of the solid pin. Examination in our laboratory indicates types, kind of materials and treatments to be ideal for the purposes intended."

Perhaps it would pay you to check up on Duckworth Timing Chains, too. Write us and we will gladly send our booklet "Timing Chains, Their Construction, Use and Installation" together with up-to-date chain specifications on all cars and trucks and price list.

BALDWIN-DUCKWORTH CHAIN CORPORATION

Duckworth Division
SPRINGFIELD, MASSACHUSETTS

DUCKWORTH
SILENT SHOCK-ABSORBING TIMING CHAINS



A DeLuxe Furniture Fleet

St. Louis Furniture Dealer Realizes Commercial Advantages of Attractive Delivery Equipment

THE trucks any concern employs are an advertisement for the concern and should reflect its standing and prestige in the community. The commercial advantage of attractive delivery equipment is well realized by the progressive furniture dealers throughout the country, and they appreciate that intangible appeal to the customer when he or she sees a de luxe delivery truck drive up to the door. It is an asset not to be overlooked.

It is a well known fact that for exterior work the pyroxylin lacquer finishes are much more durable and satisfactory when applied to metal than when applied to wood. But there is also a difference among metals, and the most lasting finish is found on the metal that is resistant to atmospheric corrosion. In the application of metal panels, the sheet must be flat and free from surface imperfections. This is especially true in the case of panels for moving vans and large package cars; for, if the material is not absolutely flat, the finished body has a wavy appearance that is objectionable. Lightness, of course, is a requisite wherever metal is used in truck construction for it is expensive to haul dead weight.

Aluminum combines these three essential characteristics; it is light, resistant to atmospheric corrosion, and can be obtained in sheet form free from buckles and wrinkles. The fleet of delivery trucks of the Lammert Furniture Company, St. Louis, is typical of the application of aluminum. These trucks pass through practically all of the cities within a radius of five hundred miles from St. Louis, and invariably attract a great deal of attention and favorable comment.

In building the truck bodies for

the Lammert Furniture Company, weight saving was a minor consideration, yet these trucks have a pay load of 1,000 pounds more than the former trucks which had steel panel bodies. Each truck is of sufficient size to carry the furnishings for four rooms. Other concerns who have employed aluminum, more with the view of reducing body weight, have been able to increase their pay loads between 2 and 4 pounds per cubic foot.

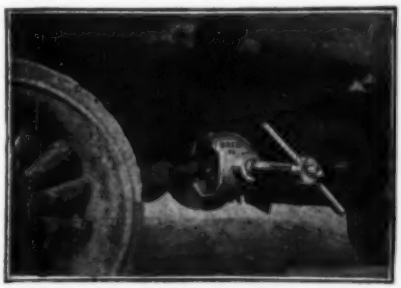
The advantage of weight reduction in body construction is not only realized in increasing the useful load of the truck, but while the truck is traveling light or with the same load it is capable of carrying with a steel body. In other cases, improved schedules due to quicker acceleration are possible; the fuel consumption is lowered; and the wear and tear on the chassis and tires materially reduced.

Aluminum is not the most expensive or the least expensive material used in truck body construction. In competition with the heavier metals, an aluminum truck body will cost more, but the additional expenditure is soon offset by the increased pay load and by the decreased operating cost. Furthermore, after the trucks have reached the end of their period of usefulness, the residual aluminum will be worth several hundred dollars.

The truck illustrated in this article is a 2½ ton Autocar Six. The body was built by McCabe-Powers Auto Body Co., of St. Louis, Mo. This truck is used for local and long distance furniture delivery, operating approximately 150 miles per day.

In the construction of this aluminum body, grey plate flat sheet was used. The saving of 750 pounds in body panels made possible the use of a lighter out-rider construction. This, in turn, decreased the dead weight an additional 250 pounds, making a total increase in pay load, or decrease in dead weight of 1,000 pounds. The weight saving, to repeat, was a minor consideration in the construction of this body; attractive appearance was paramount.

Some interesting detailed cost information showing the many and varied savings to be made through the use of aluminum bodies has been compiled and may be obtained free of charge. Readers desiring this literature can obtain same by addressing their requests to either The Aluminum Co. of America, 2461 Oliver Bldg, Pittsburgh, Pa., or to the Editor of this publication who will be glad to see that these requests are promptly filled, without obligation.



For all Mack Chain Drive Trucks—Use

GREB MACK SPROCKET PULLERS

A one man Tool, adaptable to all sizes of sprockets on all models of Mack Trucks.

No. 70 Puller, for removing all Sprockets up to and including 15 Tooth. Price, $45.00.

No. 70X Puller, for removing all sizes of Sprockets from smallest to and including 18 Tooth. Price, $45.00.

No. 70Y Puller, for removing Yellow Coach Differential Worm Gear. Price, $45.00.

Made of high grade steel, comes complete with bar wrench.

TEN DAYS' TRIAL—If your distributor cannot supply you, send us your order. Try it for 10 days. If YOU are not satisfied return it to us and we will refund the money.

THE GREB CO.
310 STATE STREET BOSTON, MASS.

Laws *Favor* 6-Wheelers

Truck Executive Points Out How Legislatures in Many States Favor Six-Wheel Vehicles

ALTHOUGH more than 3,500 bills were introduced in various state legislatures throughout the country last year, all pertaining to automotive matters and many declared to be harmful to the best interests of the industry and its millions of customers, some of the legislation, both proposed and enacted, has been of a distinctly constructive nature. Such is the contention of C. A. Tilt, president of the Diamond T Motor Car Company, who continues with an analysis of several trends in motor truck legislation which he terms as steps in the right direction.

"There is an increasing tendency toward raising the speed limits on trucks equipped with pneumatic tires," says Mr. Tilt. "This at first might seem like discrimination against solid tires, but it is not, for pneumatics are fast becoming universal on even the heaviest duty trucks. They are, of course, easier on the street and highway pavements. Furthermore, on this subject of increased speed limits it may be said that modern trucks today operate far more smoothly and quietly, with greatly reduced vibration, than their forerunners.

"Another favorable measure being legalized in one state after another is the allowance of heavier loads on six-wheel than on four-wheel trucks. This makes for lower road maintenance costs and higher efficiency of the operator."

The accompanying table, compiled under Mr. Tilt's direction, shows how the trend toward six-wheelers in the heavy-duty class is being recognized and encouraged in a legislative way.

"In Virginia, which has a maximum allowance of 40,000 pounds, the number of wheels or style of tires used makes no difference. At the other extreme are Delaware and Ohio which maintain specific provisions on both of these points. The weight allowed for pneumatic-tired 4-wheel trucks is 24,000 pounds, while those equipped with solid tires are permitted 22,000 pounds in Delaware and 20,000 pounds in Ohio.

"Connecticut allows a weight of

C. A. Tilt, President, Diamond T Motor Car Company.

30,000 pounds for pneumatic-tired trucks and 26,000 pounds for solids. Iowa sets the limits at 28,000 and 24,000 pounds respectively.

"On the other side of the picture we find a problem that needs to be combatted—namely, the exorbitant gas tax, averaging around four cents a gallon and running as high as six cents in several states. This is a double unfairness in this respect, for not only is the tax too high but in a number of cases the money received is diverted from its original object to more general purposes.

"The motor truck is daily taking its place as an increasingly important factor in hauling the world's goods. Legislators should realize this and aid the truck in its forward march. Those who build, sell and use trucks can help further sentiment in this direction through cooperation in reducing accidents, as many have done, by systematic safety campaigns and methods of training operators so that they will be imbued not only with a spirit of carefulness but courtesy and consideration as well."

Wetzel Now Adv. Manager

R. L. WETZEL has been appointed Sales Promotion and Advertising Manager of The Dayton Rubber Mfg. Co., to succeed Edwin B. Self, who resigned after ten years with the company to establish his own business in Chicago. Mr. Wetzel has been with the company for five years.

How State Legislatures Encourage the Use of Six-Wheelers

State	Lbs. Weight allowed 6-wheel trucks	Lbs. Weight allowed 4-wheel trucks
Arizona	34,000	22,000
Arkansas	28,000	22,000
California	34,000	22,000
Delaware	38,000	24,000
Idaho	40,000	24,000
Illinois	40,000	24,000
Kansas	34,000	24,000
Louisiana	38,400	32,000
Maryland	40,000	25,000
Missouri	38,000	24,000
Nevada	38,000	25,000
New Mexico	26,400	22,000
Ohio	36,000	24,000
Oregon	34,000	22,000
Pennsylvania	36,000	26,000
Rhode Island	40,000	28,000
Texas	30,000	22,000
Washington	34,000	24,000
Wisconsin	36,000	24,000

Call In "Dr. Boxocket"

WHEN you have a wrench problem to solve—when you need specific tools for hard-to-get-at jobs; call in Dr. Boxocket, specialist on tough operations. Such is the advice of Motor Tool Specialty Co., 14 E. Jackson Blvd., Chicago, Ill., who have just issued an interesting handbook, entitled "Special Boxocket Wrenches."

Besides being an interesting catalog, the handbook shows how these special tools are used on tough operations, and how "Dr. Boxocket" performs operations on such jobs as Macks, Whites, Internationals, Buda motors, Continentals, etc. The handbook is yours for the asking. Write the company mentioned above and ask for handbook on Special Boxocket Wrenches, mentioning THE FLEET OWNER.

Adds to Bearing Service

AS one more step in a well-defined national expansion program inaugurated in 1924, negotiations have been completed for the acquisition of the Watkins Manufacturing Company and all its subsidiary corporations, by The Federal-Mogul Corporation of Detroit.

The Federal-Mogul Corporation has consistently maintained a complete, nation-wide engine bearing and bushing service for both automotive manufacturers and the automotive repair and fleet trade, the Watkins Company rendering highly specialized service to the automotive field on rebabbitted rods.

The acquisition of the Watkins Company by Federal-Mogul promises many selling and distribution economies, for the complete Federal-Mogul line, growing directly from the consolidation. All present Watkins plants will be operated without change of personnel or policy, to be gradually coordinated with the Federal-Mogul warehouse system. Additional stations will be opened from time to time, when trade indications are that better service will be rendered by so doing.

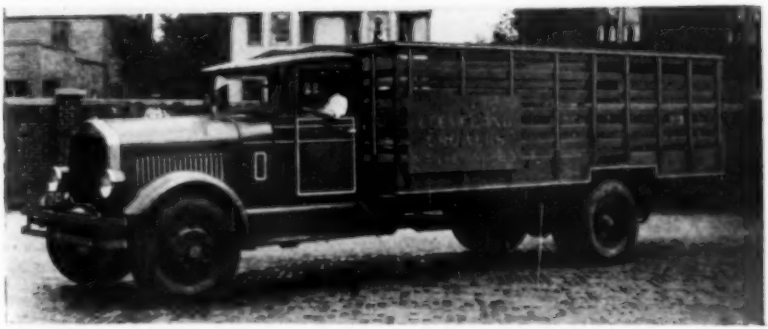
Valves Lower Maintenance Costs

EVERY fleet owner is vitally interested in lower maintenance costs. It is one of the largest items which control profits.

Maintenance costs in each industry are based on a certain unit of results. For example, large bakeries base ther fleet maintenance expense on the cost of delivering 100 loaves of bread. One of the lowest maintenance costs per unit which has been found in the baking industry is 50c per 100 loaves delivered. This low unit cost was established in 1929 by the Laub Baking Company of Cleveland, Ohio which operates 66 trucks.

Judging from a recent statement made by Mr. Henry Friedrich, Jr., Maintenance Superintendent for the Laub Baking Company, valves played an important part in achieving this low maintenance cost, not only from a standpoint of replacement expense but from the angle of regrinding costs.

During 1929, the Laub Baking Company standardized on the exclusive use of Toledo "Super-Forged" Valves in their fleet. This resulted in the elimination of valve trouble due to warping and burning which had been previously experienced and during the entire year not one valve replacement was made in the entire fleet of 66 trucks. Regrindings averaged only one per truck for the year and greater mileage per gallon was secured.



Two New Sixes by White

Models 63 and 64 Designed for Heavy and Medium Duty Hauling on Faster Schedules

TWO new six-cylinder high speed motor trucks, designed to cover the medium and heavy-duty hauling field, are announced by The White Company, of Cleveland.

More payload, more trips per day, a greater range of operation, together with flexibility in traffic, quick pick-up and low cost of operation are some of the advantages claimed for these new White models.

Designated as Models 63 and 64, they embody many latest features and can be furnished with the necessary equipment and ability to cover the whole range of dump truck work, city and inter-city hauling and also semi-trailer operation.

The Model 64 is a heavy-duty chassis with a 100-horse-power engine of the six-cylinder, overhead-valve type with seven-bearing crankshaft, 4⅛" bore and 5¾" stroke, giving a piston displacement of 519 cubic inches. Two-spark ignition, electrically synchronized, aluminum pistons and salt-cooled exhaust valves are special design points.

A four-speed, heavy-duty type White-designed transmission with White clutch gives added pulling ability. An auxiliary transmission can be furnished for the operation of winches, pumps, etc. Electrical starting and lighting is standard.

Either two or four wheel air brakes are available, on wheelbases of 180" standard and optional 157" 195" and 215", the latter at extra cost. The rear axle is of the dual-reduction, full-floating design.

The Model 63 is powered with a six-cylinder, overhead-valve, seven-bearing crankshaft engine, with a bore and stroke of 4x5¼ inches, giving a piston displacement of 396 inches. Aluminum pistons are used, together with special salt-cooled exhaust valves.

Electrically synchronized, dual ig-

(*Please turn to page 48*)

nition system with independently operated sets of plugs insure maximum efficiency. The clutch is of the single-plate type running in oil. The four-speed transmission is a heavy-duty type of White design.

The front axle is a heavy design and the rear axle is a new single-reduction, full-floating with provision for various high pressure and balloon tires. A range of five ratios is available to meet any type of hauling requirement.

Service brakes are of the four-wheel hydraulic type, assisted by a vacuum booster. Air brakes are interchangeable. This model is available in three wheelbases, standard 168", optional 157" and 188".

New Parts Warehouse

BORG - WARNER SERVICE PARTS CO. announces the establishment of a parts warehouse in Minneapolis. The new branch, located at 422 S. 7th St., is already in operation. Other established warehouses taken over by the newly-formed corporation include those in New York, Chicago, Atlanta, Dallas and Oakland. Overnight distribution of parts to jobbers is promised by the new warehouse, in Minnesota, the Dakotas, Northern Wisconsin and the upper peninsula of Michigan.

"Fourteen Reasons Why"

WORD just received from Mr. L. B. Boyd, vice-president of DeLuxe Products Corporation, La Porte, Ind., indicates that sales of their light-weight, cast-iron pistons have shown an increase of over 500 per cent in the last twenty-four months. This firm will gladly send any reader of this publication a copy of their new booklet "Fourteen Reasons Why" on request.

Toledo Valves Show Increase

ANNOUNCEMENT recently received from J. E. Adams, Sales Manager, Toledo Steel Products Company, Toledo, Ohio, states that their first six months of 1930 shows a 12% increase in sales of Toledo "super-forged" steel valves over the same period last year.

In order to take care of this increased demand, the Company has already installed several additional units of forging equipment and automatic machinery in their plant at Toledo; orders have also been placed recently for more equipment of this kind.

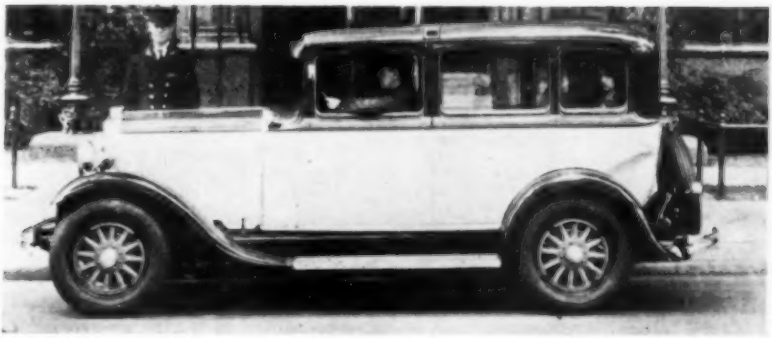
Mr. Adams has just returned from an extended trip along the Atlantic Seaboard; he reports that very favorable conditions now exist with a very bright outlook for further improvements.

S. P. A. Truck Corp. Formed

THE S. P. A. Truck Corporation has been organized to manufacture and market Studebaker and Pierce-Arrow trucks, busses, funeral cars, ambulances and other commercial vehicles.

A. R. Erskine, president of The Studebaker Corporation, is president of S. P. A. Truck Corporation; J. M. Cleary, vice president and general manager; A. G. Rumpf, treasurer; J. F. Cotter, secretary; H. E. Dalton, comptroller; C. H. Wondries, vice president in charge of sales, with Hal T. Boulden and Paul H. Castner as sales managers.

A complete line of trucks and other commercial cars is being designed by Studebaker and Pierce-Arrow truck engineers under the direction of Fred L. Sage, chief engineer of S. P. A. Truck Corporation.



Dodge *All-Steel* Taxicab

New Cab Has All-Steel "Monopiece" Body and Many Other Modern Features of Safety and Comfort

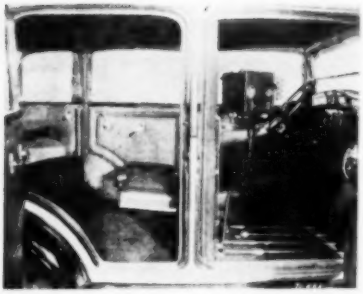
DODGE Brothers recently announced its entry into the taxicab field with an all-steel body cab, designed to meet the modern demand for a compact, easily maneuvered, smart appearing, dependable and comfortable taxicab of medium size.

The new cabs are powered by Dodge Brothers L-head, six-cylinder engines with 3⅛-inch bore by 4⅜-inch stroke, giving a total piston displacement of 189.8 cubic inches and developing 60 brake horsepower at 3400 r.p.m.

Dodge Monopiece, all-steel cab bodies built expressly for taxicab requirements are 5½ inches longer from the front of the dash to the rear panel than the standard sedan body.

The solid partition between the passenger and driver compartments is built integral with the body, lending additional strength to this type of construction. The bodies are attached directly to the frame without the use of cross-sills, as in the case of Dodge passenger cars, giving low center of gravity, a safety factor regarded as particularly important in taxicab service. Other features listed as outstanding safety factors are: non-shatterable glass; four-wheel internal-expanding hydraulic brakes; rigid chassis frame construction and non-glare vision-ventilating windshield divided horizontally near the center so that the driver may raise the upper portion and thus have clear vision at all times even when snow or rain tends to freeze on the glass.

The cushions and back of the single seat in the driver's compartment are upholstered in leather. Luggage bars are attached to the floor at the right of the driver's seat. Taxi-meters of any make may be installed and are attached by means of lag screws. The floor is covered with a rubber mat ⅜



Interior view of the new all-steel Dodge taxicab.

inches thick. Cowl ventilators are provided on each side near the toe board.

The rear seat in the passenger compartment is of generous size, accommodating three persons. Two automatic, spring actuated "flip-up" type auxiliary seats that return to a vertical position as soon as the passenger arises, are attached to the partition between the passenger and driver compartments. Underneath, these seats are covered with a rubber mat to match the floor covering. This is bound with chromium plated moulding secured by means of screws.

Leather is also used for upholstering seat cushions, backs, rear quarter panels and arm rests in the passenger compartment. Imitation leather is used for the partition, door panels and flat work beneath the belt line.

The rear seat is constructed with spiral type springs, progressive in action. Special design arm-rests are provided, padded with sponge rubber and covered with leather. Fastened to the door pillar on each side is a vertical, chrome-plated rod to assist passengers in arising from their seats.

Trimming used in the passenger compartment is designed to eliminate pockets which collect dirt and dust, thus permitting quick cleaning. Steel garnish mouldings on doors and windows in the passenger compartment are finished in walnut. New type ash chutes, which discharge their contents under the rear fender through a spring trap door, represent an improvement over the convention- type ash receiver.

The driver's license and rate card are contained in a case hinged flush in the partition just over the right hand auxiliary seat and are indirectly illuminated. All interior hardware and outside door handles are chrome plated.

Regulation taxicab running or designation lights, required by law in most states, are built integrally with the special design visor. Tell-tale lights, indicating whether the cab is occupied or empty, are built in the roof side panels at the center pillar. These lights are connected so that they will burn only when the meter flag is in the raised or "vacant" position. Steel running boards with rubber matting are used.

Designed to meet the requirements of the New York City police department taxicab code, Dodge Brothers cab has been officially approved by New York police officials.

Chassis specifications include single plate disc clutch; three speed sliding gear type transmission mounted as unit with the engine; semi-floating spiral-bevel gear type rear axle with pressed steel banjo housing; adjustable worm-and-sector type steering gear; pressed steel

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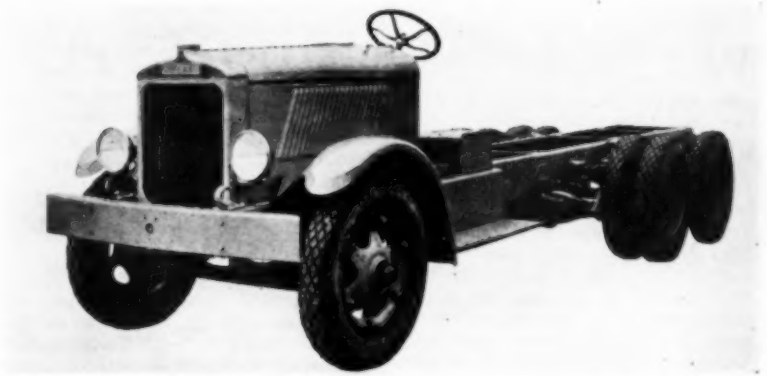


New Relay *Six-Wheelers*

Two Six-Wheeler Models Offered in Two-Wheel Drive Type, Using Relay Pendulum Suspension

RELAY Motors Corporation, Lima, Ohio, announces two new six-wheel models of the two-wheel drive type, in which the Relay pendulum suspension has been incorporated on all four of the rear wheels. These six-wheel units have been developed primarily for highway freight operation.

The engine on both these models is a six-cylinder, removable L-head type. The 50SW engine has a bore of 3¾", a stroke of 5", while the 60SW engine has a bore of 4⅛" and a stroke of 5⅛". Three-point suspension and force-feed lubrication to all crank-shaft, cam-shaft, and connecting-rod bearings is offered in both models. The 50-SW engine has an S. A. E. rating of 33.75 H.P. and the 60SW has an S. A. E. rating of 40.8.

The transmission is of the selective gear type mounted in unit with the multiple dry-disc clutch. There are five speeds forward and two speeds reverse. A pad is provided for power take-off.

The front axle of both models is of the reverse-Elliott type, drop forged I-beam section, one-piece construction with tapered roller bearings in the hubs. The driving and trailed rear axles which are flexibly connected, are of the oscillating Relay type. Distance between driving and trailed axles on the 50SW is 52". On the 60SW it is 54".

There are two complete sets of brakes on each model, operating independently. Service brakes are Lockheed-Hydraulic type, internal-expanding, operating on all six wheels. Hand brake is external, contracting on propeller shaft. The total braking area on the 50SW is

(*Please turn to page 52*)

New Grafild Representative

WORD has just been received from J. N. Kirk, sales manager, to the effect that G. H. Kelly has just been appointed district manager in charge of sales for The World Bestos Corporation in the Minneapolis district. Mr. Kelly's territory will include Iowa, Northern end of Michigan and Wisconsin, Minnesota, the Dakotas and part of Illinois, with headquarters in Minneapolis. He has had a wide experience in the selling field but is new to the automotive industry, having become interested in Grafild lining through having used it on his car.

New Relay Six-Wheelers

(*Continued from page 51*)

710.5"; the 60SW, 927."

On the 50 SW the frame is a channel section 7" x 3¼" x ¼" with full length inside reinforcement and cross-member reinforcement, amply braced by cross-members and gusset plates.

The 60SW has a frame of channel section 8⅛" x 3½" x 5/16" with ¼" full length inside reinforcement. The frame is amply braced by a 15" x 3-⅛" fishplate with cross-members and gusset plates.

The Relay six-wheeler uses a single spring on both rear axles, only one end of which is directly connected to the frame by means of a spring shackle, while the other end is attached to the trailed axle by means of an oscillating rocker-arm construction which permits it to work as a cantilever spring. Because of this the Relay six-wheeler rear spring construction is claimed to be equal to any two springs of the rigidly connected type.

A basic feature of the Relay suspension especially important in connection with this two-wheel-drive six-wheeler is the fact that the upward swing of the load automatically increases the downward pressure on the wheels, greatly adding to the traction.

The New Dodge Taxicab

(*Continued from page 50*)

channel section frame 7 inches deep; cellular radiator with chrome plated shell; semi-elliptic front and rear springs mounted in rubber; wood wheels with demountable rims, 18 inches in diameter; six-ply heavy duty 5.50 x 18 balloon tires, front and rear; double acting hydraulic shock absorbers, front and rear; fuel pump driven from camshaft; six-volt battery; ignition distributor with automatic and manual spark control; theft lock on ignition switch; 100 ampere battery; 125 watt generator.

Standard equipment includes front and rear bumpers, rear tire carrier, electric horn, purolator, black enamel headlamps with chromium plated rims, stainless steel cowl moulding, black enamel cowl lamps with chromium plated rims, speedometer, combination stop and tail lamp, oil gauge, ammeter, water temperature indicator, gas gauge, license brackets, instrument board light and ventilator.

Drums 12 inches in diameter with lining 1¾ inches wide provide a total braking area of 147⅝ inches for the four-wheel hydraulic internal-expanding service brake system. The hand brake is of the external contracting transmission type with drum 7 inches in diameter and lining 2 inches wide—a total braking area of 42 13-16 inches. The Zerk system is used for chassis lubrication.

The Austin Light Delivery

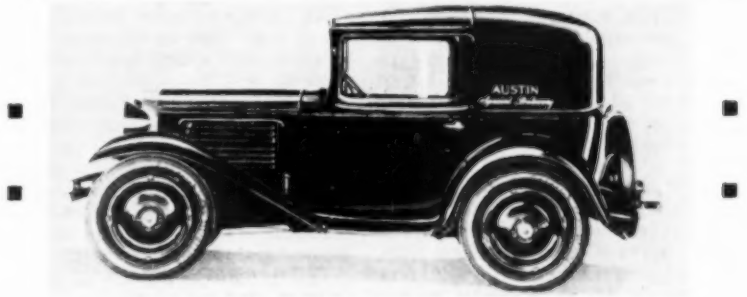
New Bantam Car Offered in Roadster, Coupe and Light Delivery at List Price of $445

ENTERING the light delivery field with a small panel body job, the bantam Austin car made its appearance recently. Three models featured its inauguration, namely, coupe, roadster and light delivery, all listing at the base price of $445, f. o. b. The entire car closely follows the design of the English car bearing the same name, although lines and mechanical features conform to American standards. The sponsor for the new Austin is the American Austin Car Co., with factory at Butler, Pa., and offices in Detroit.

A few of the outstanding features and claims of the maker might be in order here: The bantam Austin will do 40 miles on a gallon of gasoline and in maximum speed it will do better than 55 m. p. h. Its wheelbase is but 75 in. and the weight is but 1,130 pounds. Ground clearance is 8⅜ in. and the tread is 3 ft. 4 in.—16 in. narrower than standard. The small size of this car has not prevented the manufacturers from including complete equipment. It boasts starting, lighting and ignition systems, four-wheel brakes, shock absorbers and the usual set of instruments found on the conventional instrument board.

The engine of the new Austin will be found particularly interesting because of its ball and roller bearing crankshaft and the extensive use of aluminum for such parts as crankcase, flywheel housing, transmission housing and intake manifold. Aluminum pistons, of course, are used. The engine is a 4-cylinder, water-cooled unit power plant of the detachable L-head type. Clutch and transmission are built in. The bore and stroke are 2.2x3 in. respectively, developing an actual brake horsepower of 14.8 at 3,500 r. p. m. The N. A. C. C. or taxable horsepower in 7.8.

The lubrication is by pump and jet with a crankcase capacity of but



The new Austin Commercial Delivery Model

(*Please turn to page 54*)

5 pints. Cooling is by the thermo-syphon system with a capacity of 1½ gallons. Ignition is by high-tension battery system of Autolite make. The starting motor is operated by the Bendix drive.

Clutch is of the single plate type built into the flywheel with ball bearing throw-out release. Attached directly to it is a conventional three-speed transmission. Both main and counter-shafts run on ball and roller bearings.

The rear axle is of the semi-floating type, using Timken roller bearings in the differential and wheels and ball bearings for the pinion mounting. Final drive is by helical bevel pinion and ring gear. Front axle is of forged "H" section of the reverse-Elliott type. The front wheels also run on Timken roller bearings.

Springs of the new Austin are of the quarter-elliptic type at the rear with a semi-cantilever mounting. A semi-elliptic spring is used in the front, mounted transversely, as in the Ford. Special friction-type shock absorbers are fitted to front and rear of the frame. Steering gear is of the worm-and-wheel, fully adjustable type.

Brakes operate on all four wheels and are of the mechanical, internal-expanding type. Disc wheels are used with demountable rims, carrying 18x3.75 balloon tires. The turning radius is sixteen feet.

Some of the more important mechanical specifications are given herewith: The crankshaft is supported at the forward end by a double-row annular ball bearing and at the rear by a cylindrical roller bearing. The crankshaft is installed and removed from the rear. The camshaft is driven from the crankshaft by a helical cut gear and is supported in bronze bearings at the front and rear and by a roller bearing in the center.

The generator is mounted transversely in front of the engine and is driven by a gear that meshes at right angles with the camshaft gear. The distributor is mounted on the generator. A flat belt is utilized to drive the fan pulley and operates off the camshaft. It may be tightened or loosened by swinging the fan spindle which is offset.

The oiling system is interesting in that it utilizes jets which squirt oil against the cheeks of the crankshaft, from which it is conveyed to recesses in the connecting rods, to be then carried by centrifugal force to the connecting rod bearings. The cylinder walls, pistons and other moving parts are lubricated by the spray which develops because of the motion of the crankshaft. In order that too much oil should not reach the cylinders, sheet metal cups are located at the base of each of the cylinder bores, such as have been used in the past in connection with splash systems of lubrication.

The service mechanic is cautioned to clean out these jets about once in six months. This can be easily done by taking out a couple of screws from the outside of the engine and running a wire through the jets. The oil pump is of the vane type, driven off the camshaft.

The connecting rods of the new engine are of I-section forgings with babbit bearings. Wrist pins are locked in the upper end of the rods. Pistons, as before mentioned, are of the solid skirt, aluminum alloy type with three rings. The bottom ring is of the oil-scraper type but the piston is not drilled for oil drainage inasmuch as the baffle cups are said to offset the tendency towards oil pumping.

The Trouble Shooter

A DEPARTMENT devoted to correspondence from readers of THE FLEET OWNER. Any questions having to do with fleet maintenance will be answered. All properly signed inquiries will be replied to by mail and such of them as are believed to be of interest to other readers will be published in these columns.

Address your questions to the Trouble Shooter Editor. We must decline to reply to correspondence not signed with the writer's full name and address.

Special Wrench Needed Here

Question: I am looking for a good wrench that will enable us to conveniently remove the cylinder-hold-down nuts on Mack trucks, models AB and AC. We lose considerable time in doing these jobs with a home-made tool and I am wondering whether your editors know of any such tool that is sold commercially? I would thank you for this advice.—J. L., Albany, N. Y.

Answer: Yes, we have seen a special wrench for this work, made by the —— Company, whose address we are sending you under separate cover. We are sending you a little handbook, also, that outlines how these wrenches should be used. These wrenches, as you will note, do not cost very much and the savings in time gained more than offset the first cost.

Editor's Note: We sent this reader a 24-page handbook (not a catalog) which shows a line of special socket wrenches for hard-to-get-at jobs on such motors as Mack, White, International, Buda, Continental, Studebaker, Ford, Hudson, Essex, Chevrolet, Dodge, etc. Believing that other readers will also be glad to get a copy, inasmuch as the handbook shows the actual application of the wrenches, we have obtained a supply of these, and will be glad to send them to interested readers, free of charge, as long as the supply lasts. Ask for the "wrench handbook." The Editor will send it without cost or obligation.

A Little Off the Top

Question: Can you give me the cause of pistons breaking the tops off just above the wrist pins? I have had a number of Star cars with aluminum alloy pistons with Invar-struts do it; also a Paige with cast iron pistons.—W. J. H., Cumberland, B. C., Canada.

Answer: We cannot imagine any reasons why pistons should break off at the top, except that they might have been fitted with too little clearance. In the case of aluminum alloy pistons in which the expansion is very great, it is not difficult to see how this might have happened, if they were not fitted properly in the first place.

This expansion causes the pistons to "seize" and since the top expanded first, that portion would seize first and cause the rest of the piston to break off.

Another reason might be this: When fitting new pistons and rings there is usually a shoulder at the top of the cylinder bore which has been left by the old piston and rings. It is quite necessary to remove this shoulder with a hone, or with a bearing scraper; otherwise you will have trouble and will break either rings or pistons; at any rate it will cause an annoying knock.

He Thanks Us for the Advice

Dear Editor: Some time ago I wrote you in regard to an Oakland car that gave me trouble in the steering. I just want to tell you that the information gained from your good advice was all that we needed to clear this up. The caster of the front axle had been upset and by correcting it the car runs as good as new; in fact the driver says he doesn't think a new one could run any better.—M. D. J., Hoskins, Nebr.

Aluminums for Auburn

Question: I have an Auburn, 1927, 8-88B, 3¼ in. bore and 4½ in. stroke. I contemplate having the cylinders rebored. It now has cast iron pistons. Can I use a lighter piston, such as white metal with good results? Please advise me.—H. E. S., Leicester, Mass.

Answer: Yes, you can use either a good light-weight cast iron piston, or an aluminum piston in this car with good results. If you decide to use the latter, it would be well to use the Invar-strut type. If your jobber does not have these in stock, you can write directly to any of the piston manufacturers whose ads appear in this publication.

We have just been in communication with one of the leading cylinder regrinders of this city, who tells us that he often uses this type of piston in the car you mention, and that it makes a satisfactory job.

How to Test Condensers

A HANDY trouble finder which fleet mechanics will appreciate is illustrated and described here, through the courtesy of the Champion Spark Plug Company, who have recently had their attention called to faulty condensers as being the cause of a recent epidemic of mysterious ignition troubles.

The condenser tester, as built and assembled by the company, is efficient and cheap and can be used for other test work as well. The following parts are required: Six 45-volt B batteries; three 10-watt, 110-volt bulbs, with sockets; one D. C. milli-ampere meter; one 10-amp., single-pole, porcelain-base switch; two small battery test clips and about five feet of high-tension cable and a few feet of primary cable for connecting the batteries.

The accompanying sketch will show that the batteries are wired in series, that is from positive to negative and so forth, giving a total voltage of about 270 volts D. C. However, a fresh set of batteries will actually measure 300 volts. Care should be exercised with this current as it will shock and burn quite severely. The batteries should be placed in a wooden case with a handle at each end and covered by a board on which the three bulbs, milli-ammeter and switch can be placed.

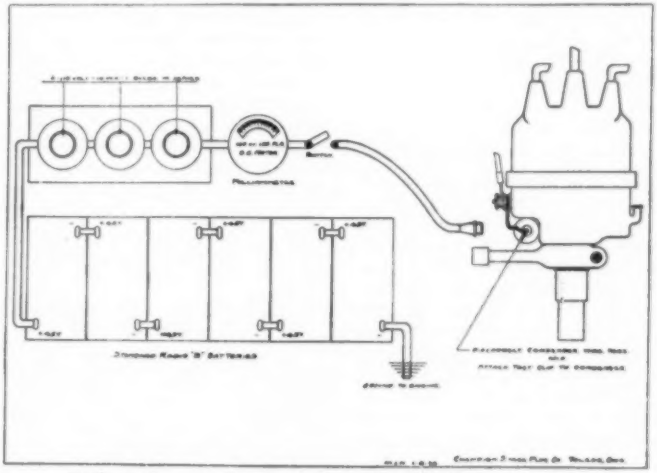
The negative end of the bank of batteries should be grounded to the engine and wire from the positive end run through the three bulbs in series and through the milli-ammeter and switch to a three foot test lead wire. The 300 volt switch should be left open at all times except when testing.

To test the circuit, first ground the test lead wire on the engine and close the switch for a few seconds. The bulbs should light brightly and give a reading of about 80 milliamperes.

To test the condenser, the connection should be taken off the condenser and the test lead clipped on so that it touches nothing else but the terminal of the condenser. Then close the switch and observe carefully any deflection of the milliammeter needle. On a good condenser the needle will flicker very little and return to zero immediately. On a bad one, the reading may stay at 2 or more milliamperes, but in case of one that is short circuited the lamps will burn brightly and give you 80 milli-amperes reading.

A good condenser should hold such a "charge" for at least 30 seconds. This is easily checked by discharging the condenser to ground with a short piece of wire. It is far better to test the condensers while on the car and in their actual operating position and under normal temperatures if possible, that is with the entire power plant warmed up after a run.

In making this tester, the company used a Western Model 301 D. C. 150-Milliameter of the radio type, which lists at about $8.00. Naturally the fleet repairman can find many uses for this testing set, such as looking for grounds or shorts in the wiring system of any car. The diagram is self-explanatory.



Using the condenser tester described in this article.

More About Muffler Explosions

Question: We have a 1926 Nash Special Six that is in very good mechanical condition, being both fast and powerful, but when the foot is taken off the accelerator pedal while driving along on level roads, and especially down hills, it will backfire badly with a series of loud explosions in the muffler. Changing the clearance of the breaker points alters the condition from good to worse but will not eliminate it. A lean mixture seems to make the explosions louder. The engine is also a little jerky while idling. Might this trouble lie in the carburetor, the coil, distributor or condenser? What can you suggest?—W. J. F., Cincinnati, Ohio.

Answer: Backfiring in the muffler is likely to occur on any car when the foot is suddenly removed from the gas pedal or when coasting so that the car is "pushing" the engine. Theoretically, what happens is this: The sudden closing of the throttle results in a very high vacuum in the intake manifold. This excess vacuum interferes with the incoming charge, producing an over-rich mixture which is not completely burned and is consequently pumped into the exhaust manifold and muffler along with the exhaust gases. The heat in the muffler then vaporizes this over-rich accumulation and when it reaches the proper state, it is exploded by other charges from the exhaust manifold. This produces the back-firing noises in the muffler.

Since your car performs well, we do not believe that it is out of time, but we might suggest that you try a new condenser. It would also be well to have the carburetor inspected and perhaps overhauled, as we have heard that if the needle valve is worn, or the seats pitted, an over-rich mixture would result and it would not be possible to thin it down by any adjustment you could make. Another suggestion would be to weaken the throttle valve spring by stretching it. This would allow the engine to partly open the throttle valve itself and draw in the proper gas mixture. We have also heard of mechanics who drill a small hole in the intake manifold and fit it with a valve which can be opened when the backfiring occurs, thus reducing the vacuum in the manifold.

Here's another hint which might apply to your case: On some cars the pipe that supplies the gasoline to the carburetor is located very close to the exhaust pipe. This results in a "hot" gas line and we have known of a few cases where back-firing was eliminated by bending the gasoline pipe so that it was as far away as possible from the exhaust pipe. A hot gas line will vaporize the gas and make the mixture too rich.

In order to overcome the jerking while the engine is idling, we suggest that you set the breaker points at .020 in. and see that the ignition timing occurs at top dead center with the spark lever retarded. You might also check the plugs and wiring harness. See that you have the proper type of plug. Check the distributor shaft for play as well.

Timing a Packard Six

Question: Can you give me the valve and ignition timing on a 1927 Packard six? This car has a bore and stroke of 3½ in. x 5 in.—B. B. Ft. Lee, N. J.

Answer: On this engine the intake valve opens at *exactly* top dead center. Ignition timing should

be set at .012 in. piston travel *before* top dead center, with the lever in the *advanced* position. Firing order is 1-5-3-6-2-4- and valve tappet clearance should be .004 in. when engine is hot.

Look at the Serial Number

Question: Can you give me the correct firing order of a 1925 Hupmobile?

Answer: The Hupmobile model you refer to is not specifically stated. However, we believe you mean the Series E. On this model the firing order was changed after serial number 25000. Those with lower numbers than 25000 have a firing order of 1-5-2-3-8-4-7-6. On later models than this, the firing order was changed to 1-4-7-3-8-5-2-6.

Two Different Settings on This One

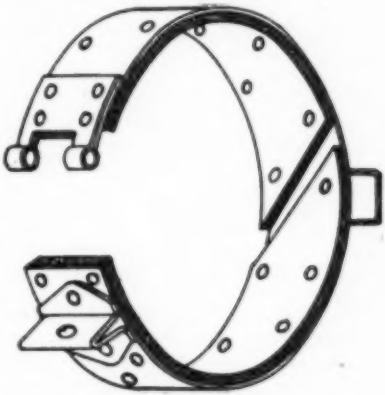
Question: We have the Chrysler special factory instrument for timing and synchronizing. In timing Chrysler engines, all of our factory settings work out perfectly, except in the early Imperial-80 models. These I set at factory settings of .020" before top dead center and find that some of them perform very well, but others are very sluggish, and we eventually have to reset them much earlier. What is the trouble?

Answer: The solution of your problem may be found in the Chrysler service bulletin, number 144CH, which advises of a change in the distributor unit on these models, one of them having a longer automatic advance than the other. This calls for a different ignition timing.

We would suggest that you first determine the number of the ignition unit. On the 656C unit, the setting should be .020" piston travel before top dead center, with the spark advanced. On the 656D unit, the spark should be set at .046" piston travel before top dead center, with the spark also fully advanced.

Transmission Brake Hint

SOME automobiles have their service brake operating on the drive shaft. The dimensions of this brake require 3½" x 3/16" lining, 23⅞" long. This type of brake has a tendency to squeak. The squeak can be eliminated by cutting out a piece of the brake lining, 1¼" wide, as shown in the accompanying illustration.



The material should be cut out at an angle, as the rivet holes are staggered. By doing this, a more accurate adjustment is permitted and the vibration which causes the squeak is eliminated.—**Jack N. Kirk, Sales Manager, World Bestos Corporation, Paterson, N. J.**

Pe-Ko Tire Changer

THE Pekin Foundry & Mfg. Co. of Pekin, Ill., announces the Pe-Ko Tire Changer, illustrated here. While the name is new and many improvements have been added, the machine has been sold for over five years.

This machine is of the "all-in-one" type, equipped to handle every size and style of rim—balloon or high pressure tires—wire or disc wheels. It is so constructed that uniform pressure is exerted at all times against the rims, eliminating danger of distorting or injuring them. A rubber pad protects the rims from receiving mars to the finish.

One feature of the changer is its convenient working height; another is the swivel base with quick-acting lock. The machine need not be bolted to the floor unless it is desired. It can be moved about the shop when necessary.

One of the tools that come with the machine is a "hand tamp," which speedily assists in the removal of even the most stubborn tire according to the makers. Special attachment for Ford wheels is also included as regular equipment, making the Pe-Ko a specially equipped machine for handling Ford tires in but a few minutes.

Speed, convenience and safety are the outstanding merits of the Pe-Ko. Interested readers of this publication can get illustrated circular and full details from Pekin Foundry & Mfg. Co., Pekin, Ill., or from the Editor of this publication.

What YOU

New Products of Interest

SKF Felt-Seal Ball Bearing

A NEW type of patented felt-seal ball bearing has just been announced by SKF Industries, New York City, in which a felt seal is provided as an integral part of the bearing.

The outer and inner races as well as the balls in this new bearing are made of high carbon, chrome alloy steel, hardened throughout. The bore and outside diameter are ground to international tolerances and standard dimensions, the same as the corresponding single-row bearings. The width, however, is

WANT to KNOW

naturally greater in order to accommodate the felt seal.

The cross-sectional view shows the constructional features and design. The seal consists of a dished inner steel plate, a removable felt, a dished steel end plate and a split steel ring fitted into the groove in the outer race to hold the assembly in place. An outstanding feature of the bearing is the ease with which the seal may be disassembled at any time and new felts applied.

New AC Plug for Fords

A NEW spark plug of two-piece design has just been introduced by AC Spark Plug Company, Flint, Mich.

Special features of the new plug, according to AC engineers, include correct size terminal to fit bus-bar; extra heavy insulator; welded side electrodes; "Isovolt" side and center electrodes; solid copper gaskets; two-piece design of correct length.

Because of these features, the makers claim that this plug greatly improves low-speed performance, is efficient at all speeds and gives good idling, fast pick-up and easy starting. Illustrated circular on request.

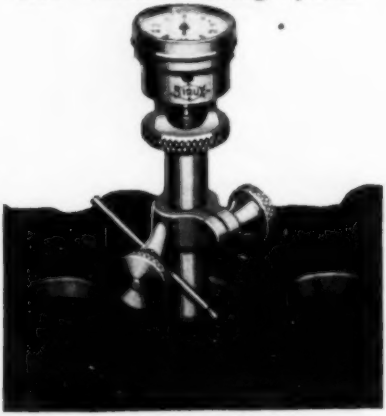
K-D Cam Type Compressor

THE No. 380 K-D cam-type compressor, illustrated here, is a one-hand tool for servicing modern motors with two-piece valve keepers and low port openings; also for motors with overhead valves.

The tool is easily operated with one hand, allowing the other to remove and replace the keepers. Equipped with extra high offset jaw to work back of motor housing. The automatic over-center lock, adjustable plunger bar and extra straight jaw are added features. Jaws are adjustable and spring tempered. *(Continued on page 62)*

Made of heavy gauge steel and rust-proofed by the Udylite process. Recommended for such cars as Auburn, Chrysler, Dodge, Hudson, Oakland, Oldsmobile, Peerless, Pontiac and Continental-Lycoming motors. Catalog sent free on request to K-D Mfg. Co., Lancaster, Pa., or the Editor of this publication.

New "Sioux" Refacing System



A SIMPLE, speedly scientific method of securing accuracy on one of the most important jobs in motor reconditioning has just been announced by Albertson & Co., Sioux City, Iowa.

It is now possible through the use of Sioux tapered pilots and valve seat indicator, to determine in thousandths of an inch just how much a valve seat is out of true.

If the valve seat is not in correct alignment with the valve guide, or the seat is worn out of round, the amount of eccentricity can be readily seen by use of the valve seat indicator.

It is not only accurate, but eliminates cause of worry over the result of the finished job, according to the makers. One of the advantages of the new line of tapered pilots is that it is not necessary to buy a complete set of new reamers, as Sioux reamers are readily adaptable to the new pilots.

An interesting book entitled "Bringing Factory Precision Standards Into the Shop" is just off the press and will be sent free on request to the Editor, or to Albertson & Company, Sioux City, Iowa.

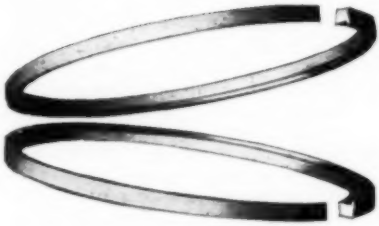
Spiro Steel Running Boards

A NEW line of running boards is just being announced by C. Spiro Mfg. Co., Dobbs Ferry, N. Y. The new boards are patented *steel* running boards now being made for Dodge, Essex, Hudson, Oakland and Hupmobile for those models on which the original equipment is steel.

The new line makes it possible for Spiro distributors and jobbers to furnish steel boards to replace steel and wood boards (with patented self-aligning bolts) to replace wood.

In other words, the user is given a replacement that is a perfect match with the original equipment, but with features of strength and quick attachability that make them desirable as replacements.

A new information chart giving valuable size and style data, with price list and other literature, will be sent free on request. Address C. Spiro Mfg. Co., Dept. R1, Dobbs Ferry, N. Y.



"Tungtite" Compression Rings

THE Tungtite compression ring, used as standard equipment on various makes of automobiles since as far back as three years ago, is a product of The Perfect Circle Company, Hagerstown, Ind., who now announce that this type of ring is available for replacement purposes through distributors of Perfect Circle Rings.

Tungtite compression rings are always used in pairs. Each ring is counterbored on one edge, forming an "L" shaped cross section. The rings are installed in a special ring groove with the counter bored edges facing each other.

The groove to accommodate these rings is machined with an annular projection or "tongue" in the center, which is lower than the outer walls of the groove. This tongue occupies the space between the counterbores, separating the rings, and forming a "T" shaped cavity between the rings, which acts as a reservoir for oil.

The manufacturers recommend that when it becomes necessary to replace the rings on a car that is Tungtite-equipped, that the same type of rings be used. It is not practical, however, to regroove a piston of the conventional type to take Tungtite rings, so that the only place where they can be used is on those cars that used them as standard factory equipment. A new catalog on Perfect Circle rings has just been issued, which the makers will be glad to send free on request.

Kimberley Appointed

F. L. KIMBERLEY has just been appointed District Representative for the New England States, for the World Bestos Corporation, Paterson, N. J., according to announcement just received from J. N. Kirk, Sales Manager. Mr. Kimberley has been in the automobile business for about twelve years and is well acquainted in that territory. He is also a member of Booster Club No. 13.

Valve Seat Reamer Set

THIS is Set No. 82, offered by Albertson & Co., Sioux City, Iowa, bearing the familiar "Sioux" trademark.

This valve seat reamer set handles practically 90 per cent of all automobile motors. It contains 45 and 30-degree roughing and finishing reamers; 15 and 75-degree nicked tooth reamers for narrowing valve seats; and expanding pilot stems. For further particulars ask your jobber or write to the Editor.

Motor School Cuts Costs

(*Continued from page 16*)

pervising laboratory work in the shop. The teaching is supplemented at frequent intervals by showings of technical motion pictures, and by technical lectures by members of the faculties of Columbia University, New York University, and the College of the City of New York.

Besides this initial supervision by prominent educators comprising the advisory board, members of that body and the deans of the various divisions of the college make frequent visits of inspection to classrooms. No advance notice of these visits is given. Hardly a lecture is delivered that is not attended by some official of the city school system. At the conclusion of the class, the observer makes a complete report, either commending the effectiveness of the instruction with reasons for praise or outlining how greater efficiency may be obtained.

"The course of study", said Commissioner Whalen, "is as carefully planned as is that of any college. We realized that one of the fundamental difficulties to be met in developing the school was to acquaint the officers selected for lecture service with those principles of teaching technique without which the work might become mere organized telling. Therefore, it was deemed advisable to call upon a limited number of expert school men to meet the dean and his assistants in group and individual conferences and to have them lay down certain principles relating to equipment, assignments, programs, record keeping and methods of instruction. These educators have kept in continuous touch with the college and have rendered service that is not only a fine index of their professional skill and knowledge but a'so their fine conception of citizenship."

The experience of Commissioner Whalen with "New York's Finest" merely proves again that even "the finest" can be made finer. Since such substantial economies have been effected there, it is reasonable to believe that the education idea, if applied by motor fleet operators elsewhere, would work changes equally beneficial.

Recent Transportation Progress

(*Continued from page 24*)

the results of tests conducted by the United States Bureau of Public Roads and are self-explanatory. They show, however, that the six-wheel truck with pneumatic tires when carrying an 8¾-ton payload shows smaller impacts than a 2-ton truck on pneumatic tires. (*See Figs. 1 and 2 on pages 20 and 22.*)

Besides, the riding comfort is greater with six-wheel trucks because the two rear axles are balanced, as shown in Fig. 3; that is to say, when one axle or one wheel should rise, say 6 inches, the frame only rises one-half the amount of what it would with four-wheel trucks.

All these improvements were made to accomplish one purpose—reducing the cost of transportation.

How to Repair Tires

(*Continued from page 40*)

cut your plies as though the injury were in the center of the casing. Build your "step-up" repair in the usual way. This will result in a number of the plies extending beyond the bead. Trim these plies even with the toe of the bead as shown in Figure 3 and gum-strip over the trim.

Endorse Hoover Code Revisions

THE new Hoover Code amendments providing complete reciprocity for all motor vehicles and increased weight limitations for trucks were enthusiastically endorsed at the semi-annual meeting of the National Automobile Chamber of Commerce, commercial car division, recently held.

Leading truck manufacturers of the United States pledged their cooperation in the movement to have the Hoover Code recommendations incorporated into the motor vehicle regulations of every state.

"Nationwide adoption of the Hoover Code recommendations on reciprocity and truck weights will be of great economic benefit to the public because of the distribution savings that they will effect," Mr. A. J. Brosseau, New York, president of the Mack Brothers Motor Car Co., and chairman of the Chamber's truck committee, declared.

Elimination of the "duplicate taxation evil" which has been a serious obstacle to the use of trucks in interstate transportation will be accomplished with the adoption of the Code's reciprocity recommendation, Mr. Brosseau predicted.

The provision for increasing the maximum truck weight restrictions was regarded by the manufacturers as being justified by recent developments in motor truck design.

"The modern truck equipped with balloon tires is capable of carrying much heavier loads with less damage to the highways than its solid-tired predecessor," one manufacturer expressed himself.

The Code provisions which received the endorsement of the manufacturers were those which were adopted at the National Conference on Street and Highway Safety in Washington on May 29th.

They provided that the states should extend complete reciprocity to all motor vehicles including trucks and buses and that the truck weight limitation be increased to 11,200 pounds per wheel on primary highways.

Other subjects discussed at the meeting included the technical problems of rating motor trucks for export markets and the relationship between truck manufacturers and body builders.

The meeting was held in the headquarters of the National Automobile Chamber of Commerce, 366 Madison Avenue.

Wheels, Inc., Buys Mattern

ANNOUNCEMENT was recently made of the purchase by Wheels, Inc., New York City, of the inventories, stock and equipment of the firm of Jacob Mattern & Sons, Inc., of 630 W. 52nd St., New York City, and 262 Central Ave., Newark, N. J. This merger brings together two of the strongest distributors in the Metropolitan district, in the sale and servicing of wood, wire and disc wheels, rims, parts, hubs, brake drums, etc.

New Ford Phaeton

A DE LUXE phaeton has just been announced on the Ford Model A chassis, by the Ford Motor Company. The car is distinguished by its rich equipment and by the single wide door on each side. There are two individual seats in the front, both of the folding type, similar to the well known coach model. The new model has sport lines.

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Interesting Wrench Handbook

A GREAT deal of time and money can be saved on hard-to-get-at operations by having the right wrench. With this thought in mind a number of special wrenches for trucks, buses and tractors have recently been developed by Motor Tool Specialty Company.

Among the popular ones are special wrenches for Macks, Internationals, White trucks and buses, Buda motors, Continental motors and also several of the popular passenger cars and light delivery units.

An interesting handbook, which is more than merely a catalog, illustrates and describes these wrenches and also shows with actual drawings and diagrams, where each wrench should be used and how they save time on the job. Write for your free copy to Motor Tool Specialty Company, 14 E. Jackson Blvd., Chicago. Ask for book on Special Boxocket Wrenches and mention The FLEET OWNER, please.

New Grafild Representative

WORD has just been received from J. N. Kirk, sales manager for World Bestos Corp., Paterson, N. J., stating that G. H. Kelly has just been appointed district manager in charge of sales for World Bestos in the Minneapolis District.

Mr. Kelly's territory will include Iowa, Northern end of Michigan and Wisconsin, Minnesota, the Dakotas and part of Illinois, with headquarters in Minneapolis. He has had a wide experience in the selling field but is new to the automotive industry, having become interested in Grafild lining through having used it on his car.